The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Standardisation

AN article that appears on another page shows that the movement initiated about a year ago for the purpose of accelerating and co-ordinating standardisation in the British chemical industry, of doing, in short, for chemistry what the British Engineering Standards Association has done for engineering, has been completely successful. The problem has obviously been treated in the broadest spirit, and care has been taken not to isolate chemistry from other national and allied industries but to secure its closest co-operation with them. Under one general body, to be known as the Standards Association of Great Britain, there will be four co-equal main divisions, each controlled by a divisional council, for engineering, chemistry, building and textiles. The Chemical Council will be composed of representatives of over thirty distinct organisations, and its members, which in any case must not exceed forty, will for the present be actually composed of 33. Dr. E. F. Armstrong has been elected chairman and Mr. W. Rintoul vice-chairman.

A glance at the constituent bodies reveals at once the representative character of the Chemical Council and the immense range and variety of the interests to be incorporated. In addition to four Government Departments—War, Admiralty, Air and Trade—and the Government and Chemical Research Laboratories, the bodies entitled to elect delegates represent chemical manufacturers, tar distillers, chemical engineering and plant manufacture, chemical and dyestuffs traders, ceramics, food manufacture, rubber, brewing, fuel, benzol, and petroleum industries, leather, paint, colour and varnish, and oil and tallow trades, pharmacists, dyers and colourists, public analysts, gas engineering, glass manufacture and glass technology. A mere recital of all these different but allied branches of chemical industry in its widest sense indicates the extent of the field to be covered, and the promoters may be congratulated on their success, in so short a period, in putting chemical standardisation on a national basis. The real work, of course, remains yet to be done, in establishing standards that will secure general recognition for the vast variety of materials represented by the constituent bodies, but a great step forward has been taken in the constitution of a responsible and representative governing body. This alone is a piece of constructive work for which excellent results may confidently be anticipated.

Illogical Taxations

PERUSING our report of the debates in the House of Commons on Tuesday, May 5, when the duty on hydrocarbon oils was under discussion, it was interesting to note that the member for Ilford, Sir George Hamilton, queried the legality of the turpentine tax. We have often wondered who it is who defines the accepted meaning of technical terms which arises in connection with dutiable chemical products, for in this instance it is open to question whether the Courts would uphold turpentine as being a hydrocarbon oil within the meaning of the Finance Act, 1928. Considered from a truly chemical aspect, turpentine is composed of carbon and hydrogen, for that is what its ultimate analysis reveals when it is examined in the laboratory. There is, however, a good deal of uncertainty regarding the limitations imposed by the word "oil." If the term "hydrocarbon" comprises all those organic liquids whose molecules are composed of carbon atoms and hydrogen atoms only, thus including turpentine (which is a product quite distinct from petrol and white spirit), there are many "oils" and "so-called oils" which are liable to this impost. Both sandalwood oil and orange oil, for instance, are terpene hydrocarbons, like turpentine itself, but we do not expect those who comprise our knowledgeable Parliament itself to know these things.

Thus it is that "hydrocarbon oils" become grouped into two ill-defined categories at the pleasure of a promiscuous body who seems to have little ability to

decide these things. Like turpentine and motor spirit, anthracene oil is also a "hydrocarbon," and according to its commercial designation it is also an oil, but we refrain from suggesting that it is or is not a "hydrocarbon oil," for if we merely await Parliament's decision at some future date we shall surely receive our share of amusement in this matter to lighten the burden of any such taxation imposed "within the meaning of the Act." Quite apart from considering these things on a strictly scientific basis, Parliament should also have some logical understanding of the economics of such matters as are under discussion. As pointed out by certain members of the House on the occasion to which we have already referred, turpentine is used as raw material in the manufacture of synthetic camphor, and the British manufacturer of this product has been fighting hard to establish his position in the world market from which synthetic camphor is drawn for use in other developing industries. Already the price of the British product is on a level with that of the German product, but with this extra taxation it can scarcely hope to be competitive, and so an immediate loss to the Treasury amounting to some £4,000 or £5,000 may ultimately be far less than the loss of tax on reduced profits from the synthetic camphor-dependant industries.

Employment of Alien Chemists

THE British Association of Chemists has once again drawn attention to the problem of the engagement of alien chemists by British firms. The term "alien chemist" is not an altogether pleasant one, for the science of chemistry recognises a sort of brotherhood of the widest kind in the search for truth. It is, however, a form of protection that requires permission to be obtained for the employment here of a non-British chemist. The fact that occasionally a British firm requires the importation of an expert from another country need not imply a general inferiority in the home supply; what it means as a rule is that when some foreign process is being installed it is desirable to have a competent chemist already familiar with it, and the engagement of such experts must be treated as quite exceptional. It is, however, felt that where the expert advice and the requisite qualifications can be secured in a British chemist, he should have the prior claim to appointment, and it is interesting to know that this has been brought about by representations and inquiries by such associations as the British Association of Chemists. If such protection of the native product is justifiable at any time, it would seem to be so now, for the increased claims on unemployment insurance funds show that the unemployment level among chemists is higher than usual.

The Prince's Call to Traders

THE Prince of Wales's address to the Manchester Chamber of Commerce this week on the lessons of his recent tour in South America contains some excellent advice to business people. During his visit and since his return the Prince has got through an amazing amount of work, and his decision to give his considered impressions to business assemblies in different parts of the country adds to the public obligation. Many of the points made by the Prince are familiar, but they are none the less worth remembering, and chief among them is the need for making British productions better known by an efficient and well-planned system of advertising in its widest sense—especially through the Press, which continues to prove itself the most effective medium—and through personal representation. That applies not merely to South America, but to all overseas markets, and it certainly applies to chemical products. The proof, as we have pointed out more than once, is the number of inquiries we continue to receive for the makers of chemical products who, for some reason, think it the duty of the consumer to find out where they live and what they make. That, of course, is the modern way of missing business.

Overseas Chemical Trade

FROM the statistics of British overseas chemical trade as disclosed by the Board of Trade returns for April, it is now evident that there has been a definite improvement during the last three months. This improvement is not immediately noticed from the statistics presented in their usual form, but it becomes apparent when these statistics are analysed on a percentage basis in comparison with those for the corresponding months of last year. Exports during April, 1931, were only 19·4 per cent. below those of April, 1930, whereas in March, 1931, the percentage decline was 30·5 per cent. below March, 1930. Going back another month, we find that February, 1931, showed a decline of 40·4 per cent. in comparison with February, 1930. Imports during April, 1931, have likewise improved, but here there is a definite rise of 4·8 per cent. calculated on the figure for the corresponding month of last year.

Books Received

SOIES ARTIFICIELLES ET MATIERES PLASTIQUES. By Robert Gabillion. Paris: Armand Colin. Pp. 204. Frs. 10·50.

PETROLES NATUREL ET ARTIFICIELS. By J. J. Chartrou. Paris: Armand Colin. Pp. 206. Frs. 10·50.

HANDBOOK OF CHEMICAL MICROSCOPY. By Emile Monnin Chamot and Clyde Walter Mason. London: Chapman and Hall, Ltd. Pp. 412. 22s. 6d.

ECONOMIC CONDITIONS IN POLAND (1930). By R. E. Kimens. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 56. 1s. 6d.

LAVOISIER. By J. A. Cochrane. London: Constable and Co., Ltd. Pp. 264. 7s. 6d.

The Calendar

May 16	International Society of Leather Trades Chemists: "The Silver Method of Determining Glucose." D. Woodroffe and S. A. Rundle; "Notes on Deterioration of Leather." D. Woodroffe and S. A. Wallington; "The Determination of Sulphuric Acid in Vegetable Leather." R. F. Innes. 10 a.m.	176, Tower Bridge Road, London.
19	Institute of Physics: "Physics in Relation to the Development of the Internal Combustion Engine." A. E. L. Chorlton. 4.30 p.m.	Institution of Electrical Engineers, London.
21	Chemical Society. 8 p.m.	Burlington House, London.
22	Society of Chemical Industry (Newcastle Section): Address by Dr. J. T. Dunn. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
27	Ceramic Society: Annual Meeting. 7.30 p.m.	North Staffordshire Technical College, Stoke-on-Trent.

British Chemical Standardisation

Successful Result of Negotiations

The following interesting account of the movement for a British chemical standardisation organisation shows that the aims of the promoters have been happily attained, and that the constitution for a Chemical Council has been agreed on.

THE inaugural meeting of the Provisional Council for the Chemical Division of the proposed new Standards Association of Great Britain which was held on May 7, 1931, at the offices of the Association of British Chemical Manufacturers, marks the successful completion of the negotiations which were initiated nearly a year ago. In June, 1930, a large and representative conference of chemical interests, convened by the Association of British Chemical Manufacturers, unanimously resolved that a British Chemical Standardising Body should be constituted to co-ordinate and accelerate the work of standardisation in the chemical field and do for chemistry what the British Engineering Standards Association has done and is doing so successfully for engineering. The Conference also agreed that in the interests of efficiency and economy, there should be a single national organisation embracing all forms of standardisation, and that an *ad hoc* committee should be formed to explore the situation as to chemical standardisation in collaboration with the British Engineering Standards Association.

The New Standards Association

A representative committee was formed under the chairmanship of Dr. E. F. Armstrong, the chairman of the Association of British Chemical Manufacturers, with Mr. J. Davidson Pratt, the General Manager, as Secretary, and set to work at once to devise a scheme which would permit of the incorporation of chemical standardisation with the British Engineerind Standards Association in a new standards organisation designe to meet the needs of industry as a whole. The points which the committee regarded as of fundamental importance were that the chemical interests should be on an equal footing with those of engineering, and that the new organisation should possess the flexibility necessary to enable any desired standardisation to be carried out efficiently and expeditiously.

The various discussions which took place with Mr. Le Maistre, the Director of the British Engineering Standards Association, were conducted in a spirit of the greatest mutual co-operation and assistance, and agreement was finally reached on a comprehensive scheme of organisation which fully met the views of both parties. The title for the new organisation presented some difficulty, and it was finally agreed that the title "Standards Association of Great Britain" met all requirements and was free from objections on the part of other industrial organisations.

Four Divisional Councils

As the controlling body there will be a general council to deal with matters of broad policy and general interest; this will be constituted essentially by the election of nine members from each of the divisions and by the nomination of a representative each of the Board of Trade, the Department of Scientific and Industrial Research, the Federation of British Industries, the Association of British Chambers of Commerce, and the Institution of Civil Engineers on behalf of the founders of standardisation. There will be four co-equal main divisions, each controlled by a divisional council, for engineering chemistry, building, and textiles.

Each of these divisions will be autonomous subject to the broad policy laid down by the general council, and will be free to organise itself in the manner which it finds most suitable for carrying out efficiently and expeditiously the objects of standardisation within its particular field. The Engineering Division will consist of the present British Engineering Standards Association, with the exception of those elements which will now find a more appropriate place under one of the other divisions.

The new scheme is broad in its conception and simple in constitution, and meets all the requirements of the chemical interests. It has been unanimously accepted not only by all the chemical organisations which participated in the initial conference, but also by practically every other body likely to have a direct interest in the work of chemical standardisation. Active steps are now being taken by the British Engineering Standards Association to obtain the necessary supplemental charter to give effect to the new organisation, while the new bye-laws are already in final form.

Members of Chemical Council

At the inaugural meeting of the Provisional Council of the Chemical Division on May 7 it was decided that the membership of the Chemical Council should not exceed 40, and that not more than five of these places should be reserved for the co-option of individuals whose services are likely to be of special assistance to the Council. The constitution of the Council as finally agreed is as follows:—

Admiralty, Air Ministry, Association of British Chemical Manufacturers, Association of Tar Distillers, British Chemical and Dyestuffs Traders' Association, British Chemical Plant Manufacturers' Association, Board of Trade, Ceramic Society, Chemical Society, Chemical Research Laboratory (D.S.I.R.), Federal Council for Chemistry, Food Manufacturers' Federation, Government Laboratory, India Rubber Manufacturers' Association, Institute of Brewing, Institute of Chemistry, Institute of Fuel, Institution of Petroleum Technologists, International Society of Leather Trades Chemists (British Section), National Benzole Association, National Federation of Associated Paint, Colour and Varnish Manufacturers of the United Kingdom, London Oil and Tallow Trades Association, Pharmaceutical Society, Society of Dyers and Colourists, Society of Public Analysts, War Office, Institution of Chemical Engineers and Society of Chemical Industry (jointly), Institution of Gas Engineers and National Gas Council (jointly), Glass Manufacturers' Association and Society of Glass Technology (jointly).

Work to be Undertaken

Each of the above organisations will nominate one representative with the exception of the Association of British Chemical Manufacturers, which will have five. The above list therefore represents 33 members. Dr. E. F. Armstrong has been elected chairman and Mr. W. Rintoul vice-chairman.

The Chemical Council has also given preliminary consideration to the programme of work which it will have to undertake. The actual task of drawing up standards will not be performed by the Council itself; wherever possible, existing organisations which are already engaged on standardisation will be utilised, but where such are not available, suitable technical committees and sub-committees will be formed as required to represent the main interest affected in each particular case.

Thus it will be seen that chemical standardisation has now been put on a proper national basis. There is much work of an urgent nature to be done, but if the chemical interests continue to exhibit the same spirit of loyal co-operation as they have shown in the formation of the new organisation, the success of the venture is definitely assured, and the Chemical Division can look forward to a long period of useful activity on behalf of industry.

British Industries Fair Committee

A COMMITTEE has been appointed by the President of the Board of Trade to consider and report how permanent accommodation for the London Section of the British Industries Fair could be provided and financed on a self-supporting basis, and to formulate definite proposals. The committee consists of Sir Gilbert Garnsey (chairman), Mr. John Beard, Lord Bethell, Sir Robert Donald, Mr. F. W. Hunt, Mr. Wm. Leitch, Mr. G. H. Locock, Sir Sydney M. Skinner, Mr. Claude Taylor, and Sir Gilbert Vyle. The secretary of the committee is Mr. G. H. Meadmore, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, to whom all communications should be addressed. The committee has been formed in pursuance of the recommendation to that effect in the report of November 13, 1930, of the Committee on the British Industries Fair which was appointed in February, 1930, with Viscount Chelmsford as chairman.

A Survey of the Chemistry of Natural and Synthetic Musk Substances.—(I)

By G. Malcolm Dyson, Ph.D., A.I.C.

It needs no lengthy exposition of the merits of musk and its substitutes to emphasise the paramount importance which these compounds hold in perfumery. Without musk, our range of effects would be considerably curtailed and many of the perfumes of to-day would not exist. The purpose of this article is to give a survey of the chemistry of the various substances which have odours in the musk range. These odorous substances may be divided into five distinct classes:—

1. *Plant Musks.*—Here it is interesting to note that Holmes says the true musk-plant has lost its original odour (1). This plant was introduced into this country in 1825, from British Columbia and California, since that date it has gradually lost its characteristic odour and at the present time *Mimosa moschata* is odourless.

2. *Musk-smelling Oils.*—This group includes two, or possibly three members, ambrette seed oil (often called musk-seed oil), the so-called "musk-root oil," and also the essential oil of angelica.

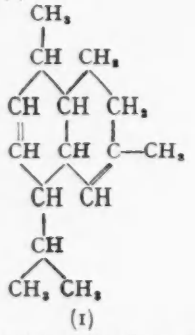
3. *Natural Musk and Civet.*—Natural musk is obtained only from the male musk-deer, found in the wildest parts of the Himalayas, Thibet and China. Civet is a secretion from the civet cat, which is found in Abyssinia; the annual output is about 2,500 kilograms.

4. *Synthetic musk substitutes.*—These are almost exclusively the higher nitro compounds of the tertiary butyl substituted aromatic hydrocarbons.

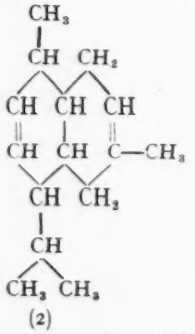
5. *Ambergris.*

The Musk-Smelling Oils

Musk root oil is but little used in European perfumery, and is obtained from the root of sumbul (*Ferula sumbula*), a plant indigenous to the Mountains of Maghian in Bokhara. The roots contain about 9 per cent. of resin and 0·3 per cent. of a volatile oil, which has a bluish colour, and from which the sesquiterpene, sumbulene, has been obtained. The oil itself should be soluble in an equal volume of 90 per cent. alcohol, and has a density of 0·91—0·94. Its optical rotation is $+3^\circ$ to $+5^\circ$. Sumbulene, the predominant hydrocarbon has the following properties $b_{14\cdot5} = 120/130^\circ$ C. D_{20° C. = 0·9; nd = 1·49618 and $(\alpha)D_{15} = 10^\circ 21'$. With hydrochloric acid it gives cadinene hydrochloride, and has, therefore, the probable formula (1) or (2).

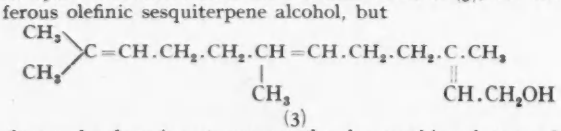


(1)



(2)

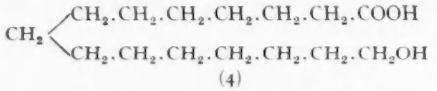
Ambrette seed oil, again, is a comparative rarity, only small quantities being distilled. It is obtained from the seeds of *Abelmoschus moschatus*, and has been recently introduced into the Seychelles, about 2,000 kilos of the seed being exported in 1921. Ambrette seed oil contains farnesol (3), an odoriferous olefinic sesquiterpene alcohol, but



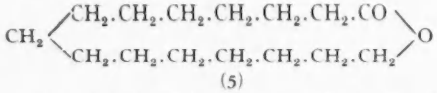
(3)

the musk odour is not, apparently, due to this substance but to a lactone with seventeen members in the ring, a fact which is of interest in comparison with the work of Ruzicka and his colleagues on the odorous constituents of natural musk (3). Kerschbaum isolated from ambrette seed oil the compound 7-hexadecene-16-olic acid, to which he gave the name ambrettolic acid, while from angelica oil (the higher fractions) Ciamician and Silber (3) isolated an acid $C_{15}H_{30}O_3$, which Kerschbaum has subsequently identified as pentadecane-15-olic-1-acid.

Considering the acid from angelica oil first, the pentadecane-15-olic-1-acid of Kerschbaum (2), could be made to regenerate the odoriferous musk-lactone, by the following chemical treatment. The parent acid (4), was converted into its bromine compound ω-bromopentadecylic acid and



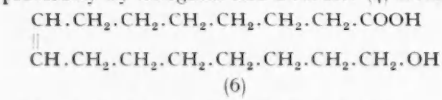
(4)



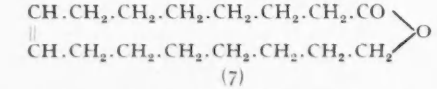
(5)

on conversion of this acid to its silver salt, and heating of the silver salt the pentadecane-15-olic acid lactone (5) is produced, which has an intense musk-like odour.

The acid from ambrette seed oil, 7-hexadecene-16-olic-1-acid (6), could be converted directly into the lactone by heating the barium salt. The formula of this lactone, which is responsible for the odour of the natural oil, is given in (7). Chemically, it is interesting because Kerschbaum was able to reduce the double bond by the process of catalytic hydrogenation into a dihydro derivative, dihydroambrettolic acid, which is identical with the juniperic acid isolated nearly twenty years previously by Bougault and Bourdier (4) from



(6)



(7)

the waxes of certain conifers. It appears to be a constant ingredient of the waxes of all conifers; it was obtained by the hydrolysis of the waxes with caustic soda, and when recrystallised melted at 95° C. On distilling dihydroambrettolic acid a lactone was produced which is the saturated analogue of the musk-lactone from the ambrette seed oil.

For the sake of completeness the following details concerning the constants of ambrette seed oil are quoted from Schimmel and Co.'s reports for 1914. The density at 15° C. is 0·9088 to 0·9161; the optical rotation $+1^\circ 19'$ to $-2^\circ 24'$; the index of refraction (D line at 20° C.) 1·47421 to 1·48013; acid number 0·8 to 2·4; ester number 137·7—180·5; while the oil is usually soluble in from 2·6—6 vols. of 80 per cent. alcohol.

Natural Musk and Civet

The source of these two substances has already been indicated; interesting facts concerning the use of these substances have been recorded, but they do not throw much light upon their chemical nature. One exception is the work of Bazzoni, who investigated the physics of musk odour on the lines of the classical experiment of Newton, who exposed a quantity of musk to the air of his study for some years, after which he failed to detect any loss in weight. Bazzoni repeating this experiment under accurate conditions found that musk did lose weight when kept in a stream of dry air, and that the odour ceased as soon as the loss in weight became zero.

The chemistry of musk substances, as with the chemistry of the musk-odorous vegetable oils, is essentially the chemistry of large rings. Chemically, the six-membered rings predominate; but compounds with five and seven-membered rings are not uncommon, and their chemistry does not offer any peculiarities, save a tendency on the part of a number of the

seven-membered ring compounds to extrude one of their members and become six-membered. This tendency was construed as a sign of instability on the part of the seven-membered rings, and the idea gradually grew up that the very large and very small membered rings were unstable, and that the instability increased as the number of atoms in the ring diverged from six. This idea was crystallised by Baeyer in his so-called " Strain Theory " (5) and did more to hinder the growth of ideas concerning large rings than any other single hypothesis. Briefly, the Strain theory involved the following ideas. The first idea is not at variance with current chemical thought and supposes that the valence tendencies of a carbon atom are so directed in space that they make equal angles with one another. Translated into figures, this means that in a normal carbon atom the angles between the valence tendencies will be 109 28′. Thus in a normal carbon chain of three carbon atoms (Fig. 1) the valencies will be arranged so that

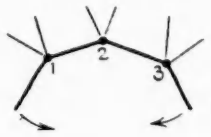


Fig. I.

Fig. II.

this angular relation is preserved intact ; if the three carbon atoms are forced to make a ring, as in trimethylene (Fig. II), then the valencies will have to be strained into the position, and with larger rings the strain will depend on the number of atoms in the ring. Baeyer worked out the angle through which the valencies would have to be strained into ring formation for various hydrocarbons, as follows :—

Trimethylene	+ 24° 44′
Tetramethylene	+ 9° 44′
Pentamethylene	+ 0° 44′
Hexamethylene	− 5° 16′
Heptamethylene	− 9° 33′
Octamethylene	− 12° 51′

The conclusion was drawn that the very large rings would be unstable, and this, together with the fact that there are certain difficulties in adapting normal syntheses to the large membered rings, resulted in discouraging investigation on this group of substances. However true Baeyer's generalisation may be with regard to small rings it will not apply to the larger rings on account of a secondary three dimensional effect coming into play. That this was so was pointed out nearly thirty years ago by Perkin (6) who showed that heptamethylene, and octamethylene were more stable than the Baeyer theory would predict, and the later synthesis of a stable nonomethylene confirmed this view. It seems that the large rings are not in any sense plane rings ; and the carbon atoms

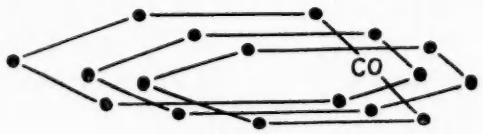
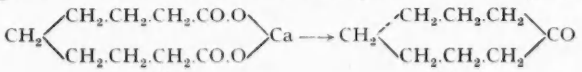


Fig. III

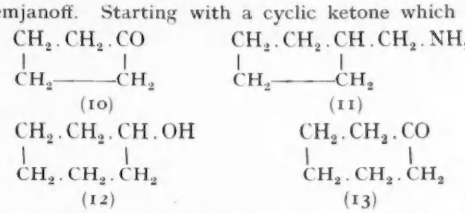
after the fifth tend to adopt a helical structure as shown in Fig. III. Thus, it is readily apparent that the so-called " strain " may not exist in such a compound.

As far back as 1893 Wislicenus, Mayer and Derlou(7) (later confirmed by Markownikoff)(8) shewed that a little cyclo-octanone could be produced by the distillation of the calcium salt of azelaic acid(8) and these investigators gave the melting point of the semicarbazone of this cyclic ketone as 85° C.



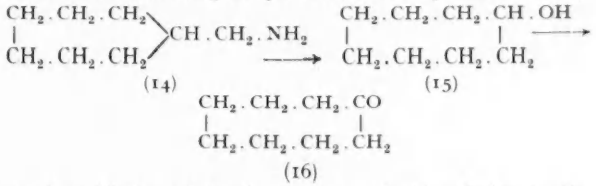
(8) (9)

which indicated that the product they had obtained must have been very impure, since Wallach (9) has shewn that the true melting point is 165° C. Wallach carried out some pioneer work on the formation of cyclic ketones and found that one could move up the series of the cyclic ketones using the method of Demjanoff. Starting with a cyclic ketone which can be



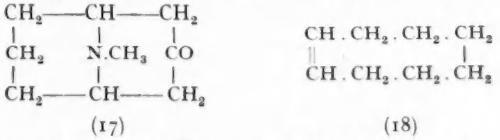
(10) (11) (12) (13)

readily obtained, such as cyclopentanone (10) this is converted by the usual chemical steps into cyclopentylmethylamine (11) which when treated with glacial acetic acid and sodium nitrite gives cyclohexanol (12), a substance which can be converted into cyclo hexanone by gentle oxidation (13). Starting with cyclohexanone, the process can be applied again with the formation of cycloheptanone. Wallach was able to prepare suberylmethylamine (14) which on heating with sodium nitrite and acetic acid gave cyclo-octanol and cyclo-octanone by



(14) (15) (16)

gentle oxidation of the former (15 and 16). Owing to the small amount of this compound available he could not proceed higher up the series. His experiments, however, proved conclusively that the higher cyclic ketones were substances of considerable stability. Again, the researches of Willstatter (10) on ψ-pelletierine, have shewn that the ring of eight carbon atoms possesses an inherent stability differing very little from that of the hexamethylene ring. If ψ-pelletierine (17) is converted through methylgranatanine into the



(17) (18)

corresponding dimethyl compound, this latter is reduced by platinum black and hydrogen to dimethylaminocyclo-octane, which gives cyclo-octene (18) via the ammonium base. When prepared in this way, cyclo-octene is a stable hydrocarbon. The cyclo-octane ketone has been produced from this alkaloid by the removal of the nitrogen group (exhaustive methylation) to give granatal ($\triangle^2$ cyclo-octanone) reduction of which by Clemmensen's method gives the cyclo-octanone. Finaly, the cyclononanone of Zelinsky (11), obtained by him by the destructive distillation of calcium sebacate, has been shewn not to be true cyclo-octanone, but another unidentified substance. The whole evidence, therefore, goes to shew that the formation of these large rings is a feasible proposition, in spite of Baeyer's theory, but it was not until the work of Ruzicka on this class of compound that really large rings were thoroughly investigated.

Work of Philippe Chuit

The comparatively small dicarboxylic acids have been known for some considerable time, although their applications in synthetic chemistry have been comparatively trifling. Thus sebacic acid $HOOC.(CH_2)_8.COOH$ and azelaic acid $HOOC.(CH_2)_7.COOH$ are conveniently formed during the large scale oxidation of castor oil, and brassylic acid $HOOC.(CH_2)_{11}.COOH$ has been obtained from erucic acid. The work of Chuit may be divided into two parts, the synthesis of the even-numbered and odd-numbered members of the dicarboxylic acid series.

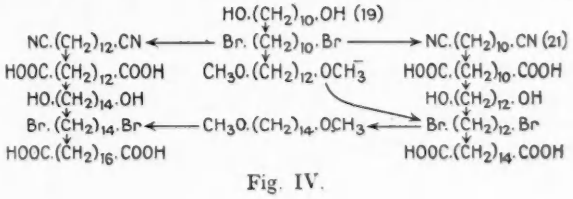


Fig. IV.

For the even-numbered acids, the chosen starting point was sebacic glycol (19) which could be prepared in quantity by the reduction of sebacic acid. The reactions by which the various acids were produced are the usual ones, and are shewn diagramatically in Fig. IV. Thus the sebacic glycol was converted to the ω-dibromdecane, and thence to the cyanide (21) which on hydrolysis gave the $C_{10}H_{20}(COOH)_2$ acid. The process could be repeated, or a modification through the dimethoxy compounds (22 and 23) could be applied, for the formation of the acids containing twelve, fourteen and sixteen methylene groups. An analogous process was applied to the odd-numbered atoms, but in this case a somewhat different scheme of preparation was utilised, namely, that shewn in Fig. V. Here the starting point was azelaic glycol.

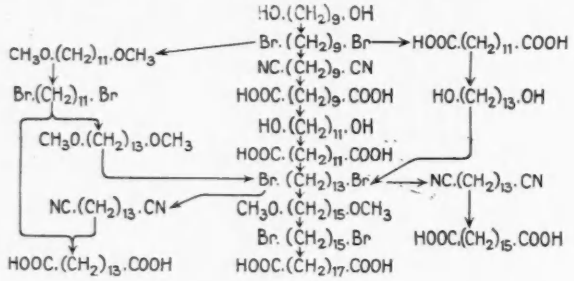
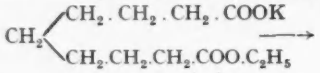
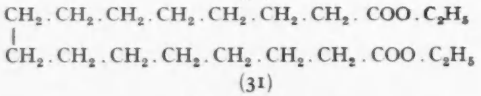


Fig. V.

The preparation of the odd-numbered dicarboxylic acids does not involve any new principles, but careful working is necessary in order to obtain sufficiently good yields to pass right through the series of operations. Chuit has worked out the conditions for obtaining these compounds under the optimum conditions, and has successfully prepared large quantities of the acids up to C_{18}. It is possible that electrolytic methods for the preparation of dicarboxylic acids might be applied to the preparation of the even-numbered dicarboxylic acids. Thus the electrolysis of the ethyl derivative of potassium azeleate (30) gives, on electrolysis, tetradecamethylene dicarboxylic acid diethyl ester (31).



(30)

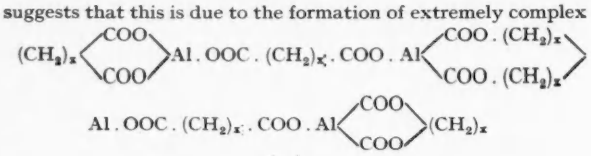


(31)

Cyclic Ketones

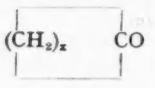
The formation of cyclic ketones was investigated closely by Ruzicka, who found that the general method for the production of the cyclic ketones, although of considerable value for the production of small rings was useless for the production of rings with more than ten carbon atoms. The method referred to is the heating of the calcium salts of the dibasic acid (12); Ruzicka found that the salts of these acids with the rare earths were more suitable for this process than those of the alkaline earths, and the thorium salts in particular were applied to the production of the large rings. Thus, even with the thorium salts the yield is particularly small unless extreme care is taken with the process. Thorium azeleate, when heated in a vacuum of 1—2 mm. pressure at a temperature of 350—400 C, gives an 18 per cent. yield of cyclo-octanone. The yield could be increased to 25 per cent. by mixing the thorium salt with copper turnings by which the heat is readily conducted into the interior of the mass. The passage of the vapour of the acid in an evacuated apparatus over thoria electrically heated to 400° C. so that the products of the reaction are rapidly removed from the heated part, has been suggested as an alternative method. The former method has been covered by patents taken out by Naef.

In this way, the whole series of cyclic ketones was obtained up to the member with nineteen carbon atoms in the ring. Incidentally, the careful examination of the products of the heating of the aluminium salts of the dicarboxylic acids led to the isolation of the di-ketones with 16, 18, 20, 22 and 30 members in the rings, formed by side reaction. Ruzicka suggests that this is due to the formation of extremely complex



(32)

aluminium salts of the acid in question, as shewn in (32). On decomposition, these salts yield a mixture of the simple cyclic ketone and the di-ketone (33 and 34), which can be easily separated. A special method of recognition has been arrived at for the di-ketones; the case of the di-ketone with thirty atoms in the ring is discussed. Thus, if the ketone is treated with benzaldehyde a mono-benzylidene derivative (35)



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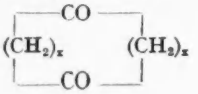
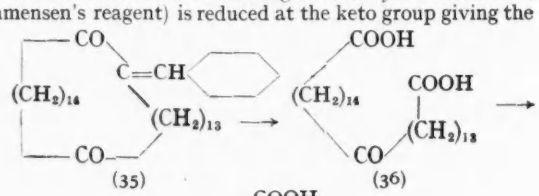
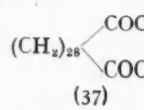


(34)

is obtained. This, on oxidation, suffers fracture of the ring at the benzylidene group, and gives a ketonic dibasic acid, which on treatment with zinc amalgam and hydrochloric acid (Clemmensen's reagent) is reduced at the keto group giving the



(35) (36)



(37)

dicarboxylic acid with 28 methylene groups. This reaction, of course, does not fix the position of the keto groups but only the number of carbon atoms in the ring.

The properties of the various ketone derivatives are shown in Table I.

TABLE I.

Substance.	m.p.	b.p.	Semi Carbazone m.p.	Odour.
Cyclopentanone	—	130	—	
Cyclohexanone	—	155	—	Bitter almond.
Cycloheptanone	—	180	164	Peppermint (faint).
Cyclooctanone	25–26	196	85	Unidentifiable.
Cyclononanone	—	96 (17 mm.)	105	Camphoraceous.
Cyclodecanone	—	100 (12 mm.)	200	Camphoraceous.
Cycloundecanone	—	110 (12 mm.)	200	Camphoraceous.
Cyclododecanone	59	125 (12 mm.)	226	Camphoraceous.
Cyclotridecanone	32	138 (12 mm.)	207	Cedarwood, faintly musk.
Cyclotetradecanone	52	155 (12 mm.)	197	Intense musk.
Cyclopentadecanone	63	120 (0·3 mm.)	187	Pure, agreeable musk.
Cyclohexadecanone	56	138 (0·3 mm.)	180	Between musk and civet.
Cycloheptadecanone	63	145 (0·3 mm.)	191	Intense civet.
Cyclooctadecanone	71	158 (0·3 mm.)	184	Feeble civet.
Cyclononadecanone	—	—	—	Practically no odour.
Cyclotriacontanone	54	—	—	None.

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(To be continued)

Trade in Panama

THE Acting British Consul at Colon has forwarded a memorandum containing hints for the guidance of commercial visitors to the Republic of Panama and the Panama Canal Zone. Copies may be obtained on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting Ref. C. 3524.

Chemical Industry Lawn Tennis Tournament

Result of Draw for First Round

THE Draw for the First Round of the Chemical Industry Lawn Tennis Tournament, which is being organised by THE CHEMICAL AGE, has now been made, and the results are given below. Competitors are requested to read carefully the brief rules printed on this page and adhere to them, as failure to do so may lead to disappointment. Players must make their own arrangements for playing off their matches, on a ground mutually agreed upon. In the event of disagreement, it should be pointed out that the first name drawn shall have the right to choose the ground.

All Matches in the First Round must be played off by June 2 and the results, signed by both losers and winners, should be dispatched as soon as possible to the office of THE CHEMICAL AGE, Bouverie House, Fleet Street, London. The last date for receiving results of the first round is Wednesday, June 3.

RESULT OF DRAW

1st Round

W. A. Godden and
L. W. Russell (The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. 'Phone: Clerkenwell 3000).
v.
H. Anning and
T. Baxter (British Industrial Solvents, Ltd., London. 'Phone: Clerkenwell 2364).

P. Meerendonk and
H. L. Sherhard (R. W. Greeff and Co., Ltd., Thames House, Queen Street Place, London, E.C.4. 'Phone: City 6550).
v.
W. S. Vorley and
G. K. Skidmore (Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1. 'Phone: Victoria 4444).

G. Stanford and
J. Shirreff (Johnson Matthey and Co., Ltd., Hatton Garden, London. 'Phone: Holborn 6989).
v.
G. A. Hoy and
E. J. Cole (J. Sherman and Co., Ltd., Downham Mills, Tottenham, London, N.17. 'Phone: Tottenham 3201).

M. Hillyard and
A. Whittle (The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. 'Phone: Clerkenwell 3000)
v.
J. W. Urban and
F. S. Mortimer (Graesser-Monsanto Chemical Works, Ltd., Victoria Station House, Victoria Street, London, S.W.1. 'Phone: Victoria 1535).

J. Carnell and
W. Taylor (Boots Pure Drug Co., Ltd., Station Street, Nottingham. 'Phone: Nottingham 45501)
v.
L. Anderson and
F. Wildman (Boots Pure Drug Co., Ltd., Station Street, Nottingham. 'Phone: Nottingham 43583).

A. T. Young and
V. Cripps (The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. 'Phone: Clerkenwell 3000).
v.
S. Perridge and
W. L. Alldis (Chemicals and Coke Ovens, Vintry House, Queen Street Place, London, E.C.4. 'Phone: Central 1411).

S. B. Gane and
D. E. Raine (Johnson Matthey and Co., Ltd., 71/73, Victoria Street, Birmingham. 'Phone: Birmingham Central 6726/7)
v.
K. W. Thorndyke and
R. Hacking (Boots Pure Drug Co., Ltd., Station Street, Nottingham. 'Phone: Nottingham 45501).

I. R. Peake and
A. G. Hay (R. W. Greeff and Co., Ltd., Thames House, Queen Street Place, London, E.C. 'Phone: City 6550)
v.
J. Marquick and
F. Brown (British Industrial Solvents, Ltd., London. 'Phone: Clerkenwell 2364).

W. Tracey and
D. G. Blow (The British Drug Houses, Ltd., Graham Street, City Road, N.1. 'Phone: Clerkenwell 3000)
v.
M. How and
J. Ince (Johnson Matthey and Co., Ltd., 78, Hatton Garden, London, E.C.1. 'Phone: Holborn 6989).

N. J. Price (Chance and Hunt) and
J. Ferguson-Davie (I.C.I.), Imperial Chemical Industries, Ltd., Oldbury, Worcs. 'Phone: Broadwell 1521)
v.
A. C. Hitchon and
L. A. White (Bakelite Ltd., Greet, Birmingham. 'Phone: Acocks Green 557/8).

Byes

S. J. Adams and
A. E. Carter (The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. 'Phone: Clerkenwell 3000). Bye.

S. Newman and
E. J. Lawrence ("The Industrial Chemist," 33, Tothill Street, London, S.W.1. 'Phone: Victoria 8836). Bye.

H. Nowell and
K. L. Fuller (The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. 'Phone: Clerkenwell 3000). Bye.

G. C. Backinsell and
R. A. Nottingham (Le Grand, Sutcliff and Gell, Ltd., The Green, Southall, Middlesex. 'Phone: Southall 2211). Bye.

George T. Gurr and
M. W. Papillon (George T. Gurr, 136, New King's Road, Fulham, S.W.6. 'Phone: Putney 1463). Bye.

W. Speakman and
S. E. Chaloner (Graesser-Monsanto Chemical Works, Ltd., Ruabon. 'Phone: Ruabon 3). Bye.

THE RULES

1. Every competitor must be a member of the chemical trade, either as a principal or a member of a staff. There is no entrance fee of any kind.

2. Each pair must be members of the same, or an associated, firm.

3. The Challenge Cups shall be competed for annually on courts of any surface in accordance with the Rules of Lawn Tennis and the Regulations of the Lawn Tennis Association. The winners of the Cups shall make arrangements for their safe custody.

4. The Tournament will be conducted on the knock-out principle, and the best of three advantages set will be played in all matches.

5 and 6 relate to entries, etc.

7. The Publisher of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the arrangements made.

8. Except in the case of the special period set apart for the final stages of the Tournament, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon.

9. The result of each match must be sent to the Publisher of THE CHEMICAL AGE, signed by the winners and by the losers, immediately after the match, and must reach the office

of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.

10. If any player be not present at the agreed place or time of the match, the opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the other's appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which they both agree, within the stipulated period.

11. Any dispute arising between players, or otherwise, shall be referred to the sole arbitration of the Publisher of THE CHEMICAL AGE, whose decision shall be final.

Society of Public Analysts

AN ordinary meeting of the Society of Public Analysts was held at the Chemical Society's Rooms, Burlington House, London, on Wednesday, May 6, the president (Dr. J. T. Dunn) being in the chair.

Certificates were read for the first time in favour of Raymond Merefield Edwards, B.Sc., Llewelyn John Howells, B.Sc., Donald Neil McArthur, D.Sc., Ph.D., F.I.C., F.R.S.E., James Sword, M.A., B.Sc., Ph.D., A.I.C.; and for the second time in favour of George Brown, A.I.C., Charles Louden, B.Sc., A.I.C., Charles Percy Money, B.Sc., F.I.C., Martin Priest, F.I.C., Arthur Goodyear Simpson, M.A., Gerrish Smith.

The following were elected members of the society: K. N. Bagchi, B.Sc., M.B., D.T.M., William Nelson Bradshaw, B.Sc., Adrian Joseph Clifford Lickorish, F.I.C., Ernest Grenville Purser, B.Sc., A.I.C., and William Waddell Robson.

Abstracts of Papers

Demonstration of a new development in filter paper was given by E. J. Guild. This paper contains 99 per cent. of alpha-cellulose, with about 0·04 per cent. of ash, and is extraordinarily strong when wet, thus offering great resistance to alkaline solution, such as caustic soda. It is suitable for the rapid filtration of coarse or gelatinous substances, and for all but the most delicate analytical work.

The "rope" spore content of flour and its significance was dealt with by A. J. Amos, B.Sc., A.I.C., and D. W. Kent-Jones, Ph.D., B.Sc., F.I.C., who stated that far less importance must be attached to the rope spore content than to the technique adopted in the bakery as a factor in the production of ropy bread.

The paper by W. R. Schoeller, Ph.D., and H. W. Webb, on the separation of tin from tantalum and niobium was in continuation of work done under the analytical investigation scheme. According to the authors, the separation of small amounts of tin from much earth-acid by Giles's process (fusion with potassium carbonate, solution in citric acid, precipitation of tin as sulphide) is not suitable for earth-acid minerals, but Schoeller and Powell's process (fusion with bisulphate, solution in tartaric acid, treatment with hydrogen sulphide, collection of insoluble residue and sulphide precipitate) has been found serviceable. For the separation of small amounts of earth-acid from much tin, a method of separation has been based on the reduction of the tin oxide by hydrogen.

A new method for detecting decomposition products in anæsthetic chloroform was described by N. L. Allport, A.I.C. Decomposition of medicinal chloroform, resulting in phosgene formation, leads to the presence of free hydrochloric acid, due to action on the alcohol which is added as a preservative. Whilst the silver nitrate test will not detect less than 10 parts of free acid per million, this new test is capable of detecting one part of free hydrochloric acid in a million parts of chloroform, and is based upon the condensation of resorcinol and vanillin by the free hydrochloric acid, with formation of a red acidic dye. By subsequent treatment with alkali a pink aqueous layer is obtained, the intensity of the coloration varying with the quantity of impurity present.

In his paper on contaminations in morphine deposited in the British Pharmacopœia process for the analysis of opium, J. N. Rakshit, F.I.C., described a modified method in which a lime solution of the opium, prepared according to the B.P. process, is extracted with benzene prior to precipitation with ammonium chloride. This yields a much purer morphine than the original process, where 5 to 6 per cent. of other alkaloids, chiefly codeine, are present.

Royal Visit to the Harvey Works

Duke of York's Tour of Inspection

THE Duke of York on Wednesday, May 6, paid a visit to the engineering works of G. A. Harvey and Co. (London), Ltd., a firm that was one of the pioneers in the Industrial Welfare Movement. The Harvey works cover an area of about 25 acres and regularly employ nearly 2,000 workers. The Duke of York, who passed through most of the shops, totalling nearly three-quarters of a mile in length, was keenly interested in the various operations in progress. In one shop was seen the first bending machine purchased by Mr. G. A. Harvey, the founder of the firm, when he started business nearly sixty years ago, and here was met the firm's oldest employee, who has been a worker there for 53 years.

Chemical Engineering Products

Afterwards the Duke walked through the four bays (each 900 ft. long and 75 ft. wide) of the new workshops. Two of these are devoted to the manufacture of steel furniture and equipment in immense quantities for offices, factories, hospitals, etc., the method of production being a continuous and progressive flow from the raw material to the finished and enamelled product. The next two bays—the heavy construction department—are concerned with the manufacture of industrial plant in steel plate up to 1½ in thickness, and in copper, aluminium, stainless steel, nickel, etc. Amongst the productions of this department are oil and petrol storage tanks of the largest capacity up to 116 ft. diameter, water softening plant, transformer tanks, fractionating towers, food processing retorts, vacuum drying, evaporating, distilling and impregnating plants, tar stills and many other forms of industrial and chemical engineering units. The Duke of York was shown the operation of pressing a large dished and flanged end 9 ft. diameter × ⅝ thick using a 750-ton hydraulic press; also the process of hydraulic riveting and pneumatic caulking. A transition from metal to wood came with the visit to the woodworking department, where office tables, desks and cabinets, in oak and other woods are manufactured.

During his tour of the Harvey works, the Duke of York inspected the ambulance station. Equipped on the most up-to-date lines and representing the highest standard in hygiene, it is one of the most efficient organisations of the kind in the country. The visit concluded with an inspection of the works canteen and recreation hall, which afford further instances of the firm's care for and interest in the welfare of its employees.

After leaving the works, the Duke motored to the Harvey Sports Ground, about a mile away. The ground, which, together with the pavilion, was presented by the firm to the Sports and Social Club, is about 14 acres in extent and is well laid out and carefully looked after by two permanent groundsmen. Both the founder of the firm, Mr. G. A. Harvey, and Mr. Sydney Harvey, the managing director, are firm believers in the benefits of welfare activities.

Modern Methods of Steel Protection

A New British Pigment

THE very important part that rust prevention can play in universal economy must be of the utmost importance and interest to all. Red lead, besides its good properties, has also serious drawbacks in general use. Every expert knows that iron constructions painted with red lead often show dangerous rust formations underneath the coat of paint. Ready-mixed red lead is also liable to cause caking and in any case red lead has to be covered by two coats of paint which, of course, increases the cost.

Recent scientific research has shown how these drawbacks can be eliminated. A new British pigment, which is now on the market under the name of Nor-Rust, forms a metallic film on iron and steel which neither scraping nor rubbing will remove. It is impossible for rust to form underneath this film. The battleship grey colour makes a top coat of paint superfluous and the action of this metallic film is stimulated by weather and atmosphere; a top coat is not even desirable. This protective film improves its adhesiveness, hardness and impermeability with age. The new pigment promises to become an important aid in preventing the damage and loss caused by rust.

Iron and Steel Institute

First Report on Corrosion of Iron and Steel

THE annual meeting of the Iron and Steel Institute opened on Thursday last, May 7, at the Institution of Civil Engineers, Westminster, the presidential address being delivered by Col. Sir W. Charles Wright, Bart., who was Controller of Iron and Steel Production at the Ministry of Munitions, 1917 to 1919.

In his presidential address Sir Charles dealt with the development of the Welsh tinplate industry. Its position, he said, was one of unaided competition in an open market, and it relied for 70 per cent. of its trade upon the export market. The industry could not afford to be haphazard. If it was to be dynamic it must continue to pay attention to technical research in all its branches. Whilst we could never hope to develop our home consumption to the same extent as America, he felt that the development of home canning would have an important bearing on the future of the tinplate industry, and it might enable plants to be run at full capacity.

Joint Committee on Corrosion

During the course of the proceedings the joint committee appointed by the Iron and Steel Institute and the National Federation of Iron and Steel Manufacturers, presented their "First Report on the Corrosion of Iron and Steel." This commitee, which is under the chairmanship of Dr. W. H. Hatfield (Brown-Firth Research Laboratories), with Dr. J. C. Hudson as official investigator, is setting out to explore the entire field of corrosion in all types of ferrous products. Its chief object is to ascertain by practical exposure tests, and by the investigation of cases in which iron or steel has been found to corrode rapidly, how such corrosion can be reduced to a minimum, either by improving the material itself or by adopting methods of protection.

The report is a document of 250 pages and deals chiefly with the correlation of knowledge and data concerning corrosion. On the question of the protection of steel, it is suggested that, given adequate protection, iron and steel should last indefinitely. It is added, however, that many users of iron and steel do not pay sufficient attention to this phase of the question, for in regard to painted surfaces it is shown that differences in the composition of the paint have much more influence on the amount of rusting than differences in the character of the metal. "The practice of bestowing care on the analysis of the metal and leaving the mixing of the paints in unscientific hands is illogical and wasteful," but, in addition, some users do not pay sufficient attention to the surface of the metal before paint is applied. Failure of the protective coating has also occurred in very carefully painted structures as a result of the flaking of small particles of mill scale, which have been left on the metal through imperfect scaling, and have ultimately been covered by the paint.

Influence of Climatic Conditions

At an early stage in the work of the committee a questionnaire was circulated to producers and consumers of iron and steel requesting them to give their experience on the corrosion of ferrous products, with particular reference to the effect of copper additions on the corrosion resistance of ordinary mild steel. The large number of replies received show that ordinary steels, if properly cared for, will last for very long periods of time, and that marked corrosion only occurs when associated with abnormal conditions.

Regarding the influence of small copper additions, the report states, it appears that data extant justifies reasonable claims that are made as regards improved resistance under some conditions. Interesting reference is also made to the effect of different climatic conditions, for in the experience of a firm of structural engineers "the worst conditions for prolonged life of steel structures are those in such places as Sheffield, and Widnes, where the atmosphere is charged with fumes inimical to steel. Seaside conditions are next worse. Damp conditions such as are found in the tropics come perhaps next, and the best conditions are those which obtain in a dry climate free from excessive dust.

From the replies received from railway companies, it may be concluded that the corrosion resistance of steel is satisfactory for most railway purposes. Shipping companies also indicate that the ordinary steels of commerce give satisfactory service for marine purposes, provided that the necessary maintenance is efficiently conducted.

In the course of the discussion on the report, Mr. T. M. Service said that during the past five or six years there has been an epidemic of local corrosion in ships built in this country, whether the steel used was British or foreign, basic or acid. He had recently been consulted in a case of this kind and found there was nothing to be said against the steel. The trouble was due to the paint, for whereas the shipowner had stipulated for a red oxide paint to be used, the chemical analysis of the paint showed it to contain 20 per cent. Fe_2O_3 and 70 per cent. of barium sulphate, and paint manufacturers whom he had consulted had told him that barium sulphate lacks covering power.

Effect of Copper in Steels

Dr. N. P. Inglis gave the results of some tests he has carried out having regard to the effect of additions of copper to mild and ordinary steels. The metals tested were mild steel, Armco iron, and two steels one of which contained 0·3 per cent. copper and the other 0·48 per cent. of copper and 0·15 per cent. molybdenum. Atmospheric tests were carried out for a year on the top of the main offices of a large chemical factory, where a real industrial atmosphere existed. As regards the actual loss in weight by corrosion, there was nothing to choose between the mild steel and the Armco iron, but the 0·3 per cent. copper steel gave a higher loss in weight than the copper-molybdenum steel. In all cases, however, the copper steels had extraordinarily resistant scales which were extremely difficult to remove and in such cases painting would not be much advantage because the scale would not be likely to flake off and take the paint with it.

Dr. Walter Rosenhain, F.R.S., urged the need for some other form of corrosion test than the measurement of the loss by weight and suggested tests on the mechanical properties of the material. He also mentioned a method of removing corrosion products which he said is better than any mechanical method he knows of, viz., that pickling in dilute acid and using quinoline as a restrainer.

"Industria Britanica": The Prince's Message

THE Prince of Wales has sent a gracious message to introduce to the business community of South America the new journal *Industria Britanica*, which is a direct outcome of the British Empire Trade Exhibition at Buenos Aires. No Englishman living knows better than the Prince of Wales what is needed to draw closer the friendly trading bonds which have united Great Britain and the South American Republics for a century, and the success of the Buenos Aires Exhibition was as much a personal triumph for him as it was an incentive to the commercial initiative of Great Britain. In his message the Prince congratulates Benn Brothers, Ltd., on "their foresight and enterprise in producing *Industria Britanica* and welcomes the first issue of that journal as "an assurance from the commercial community of Great Britain to the great South American republics that there is every intention to fulfil the promise held out by the exhibition at Buenos Aires." He describes the new venture as "a bold essay in corporate action," and as "a whole-hearted attempt to fill a gap" disclosed at the Exhibition. He accordingly commends *Industria Britanica* both to the British seller and to the South American buyer. The preparations for the first issue of *Industria Britanica* are now virtually complete, and the Prince's message assures it an enthusiastic reception in the Spanish-speaking countries of South America.

Research on Lignite Coal

THE Government of Saskatchewan (Canada) is encouraging industrial research in lignite coal in the hope of reducing costs of production and establishing by-product industries. It is reported that the Government believes that large steam power plants can be erected near the coal fields which will supply raw materials for conversion into chemicals and allied products. As an example of what may be done in the matter of by-products of coal, the Saskatchewan Government is said to be carrying on negotiations with a view to encouraging the manufacture of creosote products from Saskatchewan coal for use in the Alberta Wood Preserving Co.'s plant at Swift Current.

British Overseas Chemical Trade in April

A Noticeable Improvement

ACCORDING to the Board of Trade returns for British Overseas trade during April, 1931, exports of chemicals, drugs, dyes and colours totalled £1,599,424, which is £385,871 lower than April, 1930; imports at £1,142,186 have *risen* by £52,735; and re-exports at £334,089 have *risen* by £282,855. This noticeable rise in re-exports, however, merely offsets the heavy decline recorded for last month. For the first four months of the present year exports have dropped £2,278,749, and imports have dropped £527,208, compared with the corresponding period of 1930.

Analysed on a percentage basis, the statistics for exports and imports during each of the past four months of the present year are set out below.

	Percentage fall or rise on figures for corresponding month of 1930.			
	January, 1931.	February, 1931.	March. 1931.	April, 1931.
Exports	−36·5	−40·4	−30·5	−19·4
Imports	−22·7	−11·3	−13·2	+ 4·8

Imports

	Quantities Month ended April 30.		Value Month ended April 30.	
	1930.	1931.	1930. £	1931. £
CHEMICAL MANUFACTURES AND PRODUCTS—				
Acetic anhydride ..cwt.	—	58	—	183
Acid, Acetic .....tons	586	819	22,599	30,023
Acid, Tartaric.....cwt.	2,034	4,352	13,389	17,597
Bleaching materials ,,	8,458	10,258	8,907	20,700
Borax..... ,,	12,929	15,725	8,443	9,463
Calcium carbide... ,,	57,541	98,727	36,779	61,035
Coal tar products, not elsewhere specified, value	—	—	3,000	70,914
Glycerine, Crude...cwt.	139	120	303	219
Glycerine, Distilled ,,	688	1,376	1,589	2,838
Red Lead and Orange Lead..... cwt.	4,746	934	7,277	1,398
Nickel Oxide ..... ,,	114	—	530	—
Potassium Nitrate (Saltpetre) .....cwt.	6,712	5,780	6,651	5,066
Other Potassium compounds .....cwt.	334,380	357,334	84,479	105,347
Sodium Nitrate ... ,,	83,338	169,362	37,924	73,695
Other Sodium Compounds .....cwt.	38,716	28,490	31,205	19,738
Tartar, Cream of.. ,,	2,096	1,230	9,915	4,960
Zinc Oxide .....tons	906	640	26,018	14,710
All Other Sorts ...value	—	—	253,767	253,706
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .....oz.	82,906	104,545	6,450	7,516
Bark Cinchona (Bark Peruvian, etc.) ..cwt.	363	1,135	1,617	4,947
All Other Sorts. .value	—	—	180,753	129,474
DYES AND DYE-STUFFS—				
Intermediate Coal Tar Products.....cwt.	77	83	935	991
Alizarine ..... ,,	29	46	1,367	1,899
Indigo, synthetic.. ,,	—	—	—	—
All Other Sorts.... ,,	3,417	3,793	80,739	87,290
EXTRACTS FOR DYEING—				
Cutch .....cwt.	3,833	4,203	6,308	8,301
All Other Sorts .. ,,	3,264	1,141	9,785	3,101
Indigo, Natural .. ,,	—	—	—	—
Extracts for tanning (solid or liquid) ..cwt.	83,635	80,950	84,594	77,199
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground ..cwt.	37,396	35,689	8,622	7,149
White Lead (dry) ,,	11,874	11,238	20,520	15,795
All Other Sorts .. ,,	95,235	92,318	134,986	106,932
Total of Chemicals, Drugs, Dyes and Colours.....value	—	—	1,089,451	1,142,186

Exports

CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid, Sulphuric ...cwt.	7,364	7,033	2,253	2,306
Acid, Tartaric .... ,,	1,022	1,157	7,741	6,190
Ammonium Chloride (Muriate) .....tons	234	465	4,658	7,531
Ammonium Sulphate—				
To Spain and Canaries tons	10,339	10,565	83,215	73,895
,, Italy..... ,,	20	50	198	410
,, Dutch East Indies tons	2,021	30	17,687	221
,, China (including Hong Kong)..tons	9,894	7,612	85,959	57,264
,, Japan..... ,,	17,774	9,307	148,243	63,684
,, British West India Islands and British Guiana tons	628	1,456	5,199	10,371
,, Other Countries tons	9,537	8,488	80,519	62,915
Total.....tons	50,213	37,508	421,020	268,760
Bleaching powder (Chloride of Lime) ...cwt.	50,513	20,338	13,885	6,589
COAL TAR PRODUCTS, NOT ELSEWHERE SPECIFIED				
Benzol and Toluol..gall.	73,418	5,074	7,398	424
Carbolic acid (Crude) .	3,373 Cwt.	1,550 Galls	4,889	338
Carbolic Acid (Crystals)	1,769 Cwt.	979 Cwt.	6,115	2,571
Cresylic Acid ....galls.	112,016	118,021	14,352	12,861
Naphtha.....galls.	4,317	4,713	475	408
Naphthalene (excluding Naphthalene Oil) cwt.	11,839	839	3,464	475
Tar Oil, Creosote Oil, etc. galls.	4,392,479	625,104	113,520	7,585
Other Sorts .....cwt.	44,746	15,847	19,722	7,452
Total.....value	—	—	169,935	32,114
Copper Sulphate.....tons	5,771	8,510	137,555	160,891
Disinfectants, insecticides, etc. .....cwt.	21,722	27,306	49,917	58,620
Glycerine, Crude ....cwt.	3,216	2,536	4,299	2,976
Glycerine, Distilled .. ,,	8,703	6,721	23,066	16,580
Total.....cwt.	11,919	9,257	27,365	19,556
POTASSIUM COMPOUNDS—				
Chromate and bichromate .....cwt.	770	1,043	1,552	2,465
Nitrate (Saltpetre) ,,	743	1,060	1,381	1,811
All Other Compounds cwt.	5,298	3,859	8,581	7,360
Total ..... ,,	6,811	5,962	11,514	11,636
SODIUM COMPOUNDS—				
Carbonate, including Soda Crystals, Soda Ash and Bicarbonate cwt.	307,657	382,824	84,807	100,515
Caustic..... ,,	156,240	161,954	106,140	101,787
Chromate and Bichromate .....cwt.	1,447	2,576	2,373	4,266
Sulphate, including Salt Cake .....cwt.	89,109	6,176	11,101	1,356
All Other Compounds cwt.	40,557	46,439	42,279	66,954
Total ..... ,,	595,010	599,969	246,700	274,878
Zinc Oxide .....tons	158	254	4,810	6,091
Chemical Manufactures, All Other Sorts...value	—	—	293,864	229,070
Total of Chemical Manufactures and Products..value	—	—	1,391,217	1,084,232

	Quantities Month ended April 30, 1930.	1931.	Value Month ended April 30, 1930.	1931.
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .....oz.	205,210	130,625	19,788	13,234
All Other Sorts..value	—	—	225,134	205,259
Total ..... ,,	—	—	244,922	218,493
DYES AND DYESTUFFS—				
Products of Coal Tar cwt.	8,820	7,899	69,832	84,060
Other Sorts ..... ,,	11,957	4,000	10,146	4,123
Total ..... ,,	20,777	11,899	79,978	88,183
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground ..cwt.	1,898	2,410	1,281	1,129
White Lead (Dry). ,,	1,501	1,327	2,992	2,356
Paints and Colours in Paste Form .... cwt.	28,159	22,349	58,945	41,341
Paints and Enamels Prepared (including Ready Mixed) .. ,,	39,566	32,609	127,640	96,036
All Other Sorts .. ,,	44,005	37,682	78,320	67,654
Total ..... ,,	115,129	96,377	269,178	208,516
Total of Chemicals, Drugs, Dyes and Colours ...value	—	—	1,985,295	1,599,424

Re-exports

CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid, Tartaric.....cwt.	67	89	538	555
Borax..... ,,	618	273	387	152
Coal Tar Products, not elsewhere specified value	—	—	60	7
Potassium Nitrate (Saltpetre) .....cwt.	91	144	113	120
Sodium Nitrate ... ,,	2,359	3,109	1,205	1,455
Tartar, Cream of.. ,,	232	224	1,202	1,022
All Other Sorts...value	—	—	13,972	6,410
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .....oz.	4,828	3,486	441	349
Bark Cinchona (Bark Peruvian, etc.) ..cwt.	323	315	2,720	2,552
All Other Sorts.. value	—	—	25,136	312,178
DYES AND DYESTUFFS—				
Extracts for Dyeing—				
Cutch .....cwt.	1,134	2,670	1,631	4,071
All Other Sorts .. ,,	63	137	229	847
Indigo, Natural .. ,,	—	—	—	—
Extracts for tanning ,,	445	1,555	773	1,983
PAINTERS' COLOURS AND MATERIALS.....cwt.	789	354	2,180	1,333
Total of Chemicals, Drugs, Dyes and Colours ... value	—	—	51,234	334,089

New Method for Separating Tar-acids

THE extractability of phenols from aqueous solutions of sodium phenates is being studied at the organic chemistry laboratory of the Pittsburgh Experiment Station, United States Bureau of Mines. This investigation has a direct bearing on the problem in the tar industry of separating phenols most economically from the bases and neutral oils which are also present in tar. Ordinarily, this is done by extracting the distillate with caustic soda and "springing" the phenols with carbon dioxide, but this method necessitates a recausticising operation with lime. It has now been shown that the phenols found in tar can be extracted almost quantitatively from caustic soda by ether, and that the speed of extraction is a function of the molecular weight, the higher homologues showing the greater tendency to pass into solution. It is therefore possible that this process may become one of commercial utility for effecting a partial separation of the individual members of the tar-acid group.

Economy and the Business Man

Official Extravagance Strangling Trade

SIR ERNEST BENN, who is actively prosecuting his economy campaign throughout the country, dealt with the vital subject at the annual conference of the National Chamber of Trade at Eastbourne.

We must be perfectly definite in saying without any qualification that we cannot look to Westminster for any effective help in the problems which confront trade and industry today, Sir Ernest said. "I submit that our troubles are in a great measure due to the habit of thinking that Members of Parliament by means of Acts of Parliament can make us happy and prosperous. The contrary is actually the case, and we want no more legislative help in doing our own obs. My energies at the present moment are largely occupied in a national campaign for economy, but I need the enthusiastic help of my colleagues in trade to make the meaning of the word 'economy' clear. There is a tendency on the part of the ignorant to think that it means not spending. It does not mean cheese-paring, and indeed at a time when your bankers will only give you one and a half per cent. on your deposits you have the straight tip to spend. I define economy in one word, 'value.' When you see good value, spend; and the more you spend on good value the greater the economy."

The Foolery of Public Finance

When they examined the foolery of public finance, continued Sir Ernest Benn, they came up against simple truths which would appeal to the humblest people. There was no man so humble that he could not understand the difference between capital and income. Everybody knew that to dip into capital meant going down the scale, but that to save a shilling out of income improved their financial position. But public finance was now saturated with the crime of taking capital and using it as income. One example would suffice to show how that was being done. After the war £600,000,000 was raised by the sale of surplus war stores, and that enormous sum was spent on doles and subsidies, but that sum was realised by the sale of goods which cost the Government at least twice that amount to buy, and they had calmly left that awful bill for other generations to pay. In his judgment the present Budget was not less than one-quarter capital. Such items as the death duties, the dollar reserve, and the £50,000,000 which must be borrowed for the unemployed were all capital which was being squandered as income. Let them use the death duties to pay off debt by all means, but in the name of all that was wise, never a pennyworth of death duties for current expenditure.

"To bring the argument down to the humblest citizen," added Sir Ernest Benn, "take the case of the National Savings Movement—an excellent thing, which every employer should encourage—but which should have behind it a solvent bank. If you go into a Post Office and put down 16s., you get in return a piece of paper entitling you to £1 in six years' time, but before the week is out that 16s. is paid away in dole and there is nothing behind it but the optimistic hope tnat in six years' time there will be a taxpayer who will be able to meet the obligation."

When Queen Victoria died, Sir Ernest Benn continued, we were spending 5 per cent. of our national income on governing ourselves. That meant that 19s. in every pound was available for the private use of the people; but to-day we are spending 40 per cent. of the national income on the glorious game of governing ourselves, and that is responsible for most of our present troubles. In addition to that 40 per cent., we are borrowing more for things for which we ought to pay out of income. This all helps to make the home market very difficult, and knocks us right out of many foreign markets. With regard to unemployment, I have only one observation to make. The last census told us that there are 600,000 persons called employers in this country. It is time some thought was given to them. At present, they are never considered, and as things stand we have one great party in the State pledged to bring about their extinction, while the others only regard them as so much taxation fodder. It is a fact that since 1900 3,000 laws have been passed for the sole purpose of looking after the business of the employers in this country. If only we could reverse that position, unemployment would dwindle as rapidly as day follows night.

British Science Guild

The President on Chemical Disarmament

SIR SAMUEL HOARE, M.P., after his re-election as president at the annual meeting of the British Science Guild on Tuesday, spoke shortly on the work of the Guild.

The British Science Guild, he said, is intended to be a bridge between the world of science and the general life of the country. Its lectures and its publications show how catholic are its interests and how practical are its methods. It has, for instance, published a Catalogue of British Scientific and Technical Books with such success that a third and enlarged edition has become necessary. It has carried out an investigation into the position of the technical expert in the public services and industry; and such lectures as Sir William Pope's on "Science and Modern Industry" and Sir David Prain's on "Science Discipline" made a considerable impression upon public opinion during the last twelve months.

An Inquiry into Industry

We are now, as the annual report shows, anxious to embark upon a more ambitious programme and we intend to undertake an investigation of the potentialities of existing industries and the effect that the proper application of science would have upon them. What enquiry could be more useful at the present moment? British industry stands confronted with difficulties that were scarcely imagined before the war, competition has become keener and taxation heavier, and vast quantities of capital have been dissipated into space. A crisis such as these things mean needs all the help that scientific inquiry can apply. Are successive governments helping or hindering the application of science to industry? How far are reactionary employers and equally reactionary trade unions impeding progress? These are the kind of questions that we wish to deal with in our inquiry. I am certain that if we are given adequate support for it, we shall be able to perform a really useful piece of work at a very critical time.

Science and Disarmament

There is another field of investigation that I should like to see explored. For more than five years I was the political head of one of the three fighting services and I was daily brought into contact with the innumerable and intricate questions of national armament. It was my duty to follow armament developments and to consider their effect upon the future not only of the British Empire but of the world. The knowledge that I gained at the Air Ministry convinces me that the question of armaments is going to be the central question of foreign politics in the immediate years before us.

The long-expected conference upon disarmament opens next February in Geneva and already almost every country in the world is considering its attitude towards the questions that will then be raised. Already it is obvious that the whole problem bristles with difficulties. Political passions and traditions gather round it upon every side. Finance continuously enters into it. But I believe that if the discussions at Geneva are to be really useful, the scientific aspects of disarmament should be brought into even greater prominence than its political and financial aspects. Suppose, for instance, that agreement were reached as to the quantity and quality of existing armaments and science then develops new types of weapons that are outside the scope of the agreement, the labours of Geneva will be practically wasted. I go so far as to say that the main problem of disarmament and by far the most difficult is the problem of these new weapons of destruction and the need for finding some means of controlling them.

In recent years there has been far too great a tendency to think of the next war in the terms of the last war. If there is one thing more certain than another in the world, it is that any future war will be very different from the war of 1914. What should be the relations of science and the attitude of scientists towards this question? Should the world of science help these new developments of the weapons of destruction? The question is by no means a simple one, for scientists will discover these new rays and gases and explosives in the stride of their ordinary work. As the late Lord Moulton said: "Man mastered transport, aviation, telegraphy and the like in order to add to the conveniences of peace, and it was a result, not a motive, that he thereby revolutionised war." Can the world prevent invention and discovery being used for the purposes of destruction?

How far, again, are recent developments making gas warfare more terrible than it was in the two last years of the war? Should gas warfare be prohibited? These questions are not simple to answer, for, as we all know, there is a school of thought that maintains gas warfare is more humane than a warfare of machine guns and high explosives and that the gas warfare of 1917 exhausts the future possibilities of this kind of attack. I do not myself share this view, but the scientists alone can give a true answer to the question. In any case, ought not all these questions to be investigated, and not only by the politicians and the general staffs but by the scientists as well? Are they not just such a subject as the British Science Guild might most usefully explore? We politicians in particular need a scientific opinion upon them when the Government goes to the Geneva Conference next year. The world at large wants to know the truth about the possibilities of future warfare. If, during the next six months, the Guild could produce a report upon the kind of questions that I am suggesting, I am certain that it would be doing a most useful work in instructing public opinion.

British Chemical Standards

New Developments in Reagents and Metals

IN addition to the standard analysed samples of steels, irons, ores and non-ferrous alloys which British Chemical Standards (Middlesbrough), has prepared from time to time since 1916, a need has been felt for certain standard reagents and metals of the highest grade of purity, similar to those issued by the U.S. Bureau of Standards, for volumetric analysis, calorimetry, and pyrometry. The classifying of reagents as "chemically pure" has but little meaning and gives chemists no precise information as to the extent or nature of the impurities which may be present. The "A.R." classification is a step in the right direction, and indicated many of the limits of impurities which may be expected; but whilst this is a considerable help, it is felt that for a few special standardising purposes many chemists would like to be able to obtain, from a reliable and impartial source, supplies of certain high grade reagents and metals with a definite guarantee as to their purity and a definite statement of the amount of the impurities they contain.

British Chemical Standards' headquarters are therefore attempting to meet this requirement, and the following table shows at a glance what substances are now available:—

Material.	Purity. Per cent.	M.P. °C.	Calorific Value.	Chief Uses.
Benzoic Acid	99·9	—	6,325	Calorimetry and standardisation of vol. solutions of NaOH, etc.
Sodium Oxalate	99·94	—	—	Standardisation of N/10, potassium permanganate.
Tin	99·98	232	—	Calibrating pyrometers and volumetric analysis.
Lead	99·98	327	—	Calib. pyrom's, assaying and volumetric analysis.
Zinc	99·95	419	—	Calib. pyrom's, volumetric analysis and as tests.
Alum. Sodium Chloride ..	99·82 99·96	658 801	— —	Calibrating pyrometers Calib. pyrom's and volumetric analysis.
Copper ..	99·91	1,083	—	Calib. pyrom's and volumetric analysis.

Each sample is issued with a certificate of analysis, together with the calorific value or exact melting point according to the purpose for which the material is intended, also working details for its use.

As an example, the B.C.S. benzoic acid makes an excellent standard not only for calibrating the Mahler bomb type of calorimeter, but also the sodium peroxide type of calorimeter such as Roland Wild's. The same reagent may be used to advantage as a primary standard for alkalimetry, a use which is not yet sufficiently appreciated in Great Britain.

The prices of the samples range from 7s. 6d. to 10s. 6d. each; and anyone who is sufficiently interested is advised to send to the headquarters of the movement, 3, Wilson Street, Middlesbrough, for a free descriptive leaflet.

Case-hardening by the Cyanide Process

Interesting Publications for Engineers

EFFICIENT and economical case-hardening is such a constant engineering problem that three new booklets on case-hardening by the cyanide process are likely to be of both value and interest to all in the trade. Sodium cyanide, although normally a white crystalline solid, is employed in the molten state, and consequently is regarded as a "liquid cement," as distinguished from solid and gaseous carburising compounds which are used in those forms. Carburising by immersion in a fused bath permits complete and uniform contact between the article to be case-hardened and the case-hardening compound—an advantage that the cyanide process offers.

Important Factors in Case-hardening

One of the most important factors in case-hardening by cyanide is the conferment of a case that merges completely into the core of the material treated. By no other process, it is claimed, can such excellent results be obtained. Most forms of pack-hardening produce a case that shows abrupt change in carbon content: this is conducive to exfoliation under certain conditions. The cyanide process assures the further advantage of freedom from cementite, as the carbon content of the case is no more than 0·9 per cent., which is the maximum amount of carbon that iron will dissolve without forming free cementite. Yet the case obtained by cyanide is of perfectly uniform depth on all sections of every piece in a charge, and this depth can be duplicated exactly in other charges. Distortion is reduced to a minimum, and, owing to the homogeneity of the case and the impossibility of decarburising or scaling during the heat treatment in a cyanide melt, soft spots are practically unknown, and when they do occur they can always be traced to the raw material or to careless quenching. The temperature of the bath is such that overheating, with its attendant evils, can be entirely prevented.

The advantages of increased efficiency mentioned above are very important factors in the increasing use of sodium cyanide. One further important feature of the process, however, is the saving in time. The standard Cassel cyanide case-hardening furnace will raise a charge of 50 lb., introduced cold, to a temperature of 950° C. in 30 minutes. Thus the total time involved in carburising a 50 lb. charge to a depth of 1/32 of an inch amounts to 2½ hours. Approximately 15 minutes suffices for a case of 1/100 of an inch. The appearance of cyanide hardened steel is always attractive, the finished work being clean and bright, making sand-blasting unnecessary.

The Cassel Cyanide Furnace

For the operation of the cyanide process a special furnace has been designed by the Cassel Cyanide Co., and one of the booklets describes this in detail, with complete information on operation. The furnace is 78 in. high to the top of the canopy, and as it only occupies a floor space of, roughly, 28 in. square, it can be installed in a corner of a workshop. It is understood that the Cassel Cyanide Co. have installed a complete plant at their works at Oldbury, near Birmingham, where they undertake all types of case-hardening and heat treatment by this process for the trade. It is, however, advantageous to all who are responsible for even comparatively small amounts of case-hardening to instal their own furnaces.

The third booklet of the series deals exclusively with heat treatment of steel in molten salt baths and such points as scaling and decarburisation, prevention of distortion, quenching tempering baths, and file hardening. Reference is also made to the annealing in a molten bath containing cyanide of articles made of non-ferrous metals. Copies of the three booklets may be obtained on application to the Cassel Cyanide Co., Oldbury, near Birmingham.

Argentine Market for Barytes

BARYTES is not produced in Argentina, and supplies required for domestic consumption are therefore imported, the paint and varnish industry utilising the entire importation. Imports increased from 1,968 metric tons in 1927 to 2,384 and 3,275 tons for the respective years 1928 and 1929. Germany, Italy and Spain are the principal countries of origin. The latest available import figures, according to country of origin, are for 1927, when Germany contributed 1,116 tons; Italy, 448; Spain, 235; and the Netherlands 115 tons.

The Chemists' Exhibition

New Pharmaceutical Products

THE Chemists' Exhibition, which is organised by our contemporary, *The British and Colonial Pharmacist*, opened on Monday last, May 11, at the New Hall of the Royal Horticultural Society, Greycoat Street, Westminster, S.W.1 This exhibition, which closed yesterday, was the 38th of a series, commencing in 1895, and, like its forerunners, it devoted its attention chiefly to pharmaceutical preparations and the general trade of the pharmacist. Amongst the exhibitors, however, there were several firms who are intimately associated with the manufacture of fine chemicals considered quite apart from pharmaceutical preparations.

At the stand occupied by British Drug Houses, Ltd., of Graham Street, London, N.1, we noticed a number of the lesser known products which have been developed for medicinal uses, including vitamin products, acetylcholine, acriflavine, ephedrine, manganese butyrate, and medicinal glucose. This firm has also introduced a new highly active concentrate of vitamin A, bearing the name of "avoleum"; another new product is "gaster siccata," which is desiccated stomach tissue prepared from fresh unsalted maws and used as an alternative to liver extract in the treatment of certain types of pernicious anæmia.

Burgoyne, Burbidges and Co., Ltd., of East Ham, London, E.6, exhibited a complete range of pharmaceuticals; Evans Sons, Lescher and Webb, Ltd., of Liverpool, included pharmacy chemicals, scale preparations, and biological products to which special attention is devoted at the Evans' Biological Institute; H. R. Napp, Ltd., of 3-4, Clements Inn, London, W.C.2, displayed "ferronyl," a form of ferrous chloride in stable form, and a selection of "Merck" alkaloids, fine chemicals and drugs.

The exhibit arranged by Howard and Sons, Ltd., of Ilford, included standard ether for anæsthesia, as now made from pure duty-free spirit; iso-propyl alcohol for use in the manufacture of essences and perfumes; synthetic menthol, as made by their new patented process; thymol, and a new quinine salt which has been placed on the market under the name of "quinisan."

The next Chemists' Exhibition will be held at the Town Hall, Leeds, September 21-25, in view of the success which attended previous exhibitions held in that city in 1923, 1924 and 1928.

Problems for Civilisation

Sir Josiah Stamp on Modern Difficulties

SIR JOSIAH STAMP addressed the forty-third Individualist Luncheon in London on Wednesday. He dealt with what he considered to be four basic assumptions underlying individual beliefs, and pointed out the danger in which individualism stood from the forces working against those assumptions in the modern world. The individual freedom of choice, "the principle of substitution," was in danger from the growing accretion of large productive forces, which delimited individual opportunities. At the same time, the use of taxation as a means for redistributing income bore ever more hardly upon the minority of those whose brains and capital resources were put to the uses of production. Individualistic society could not indefinitely continue under those conditions. A stable price level was of equal importance to the individualist as to the world as a whole. Without it our civilisation would come down in ruins. Finally, there was at work in our midst a disequilibrium between the two sides of the investment machine—saving and the investment of money in productive enterprise—that was fraught with danger to us all.

Exemption of Chemicals from Duty

REPRESENTATIONS have been made to the Board of Trade under Section 10 (5) of the Finance Act, 1926, regarding crude safrol (camphor oil fraction containing not more than 90 per cent. safrol) and diphenyl, with a view to their exemption from the duty imposed by Section 1 of the Safeguarding of Industries Act, 1921, as amended by the Finance Act. Any communication on this subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, within one month from the date of this notice (May 11).

Chilean Nitrate Railways Traffic

Heavy Decline in Receipts

At the ordinary general meeting of the Nitrate Railways Co., held in London on Tuesday last, May 12, Mr. A. W. Bolden (chairman and managing director) said the statement of accounts for 1930 compared unfavourably with those for 1929. Speaking of the new Cosach policy, he said:

The original project contemplated the raising of additional funds to permit of the erection on the different nitrate pampas of large Guggenheim process plants, one of such plants to be built in the Province of Tarapaca, probably on the hitherto undeveloped Nebraska-Pissis grounds, served by the Nitrate Railways Co. Due, however, to the world-wide financial and commercial crisis, it would appear that any early construction of these plants is not contemplated, and that production of Chilean nitrate by the Guggenheim process will be concentrated in the two existing plants, beyond which nitrate production will be by the cheap-producing Shanks oficinas.

The policy of Cosach is to produce as cheaply as possible, and preferentially by the Guggenheim process—and we have to recognise that two large oficinas are available to work the process in question, and that such oficinas are not situated on the pampa served by your railways. The oficinas in question are "Maria Elena," with a productive capacity of some 600,000 tons per annum, and "Pedro de Valdivia," with some 750,000 tons per annum.

The Fertiliser Industry

The fertiliser industry is to-day suffering from probably the most severe period of depression it has yet experienced, and, therefore, I think that when conditions again become normal, as sooner or later will surely be the case, the demand for the natural commodity should correspondingly increase, especially as it is confidently anticipated that Cosach, with the facilities at its disposal, will be able to market Chilean nitrate of soda at a price per ton which will compare more favourably than hitherto with the synthetic products. Increasing sales will mean increasing production from the cheap-producing Shanks oficinas, with a corresponding betterment of the traffic position for all the nitrate-carrying railways.

The immediate prospects for traffic are not favourable for us, principally, of course, as a result of the present unsatisfactory statistical position of Chilean nitrate of soda probably necessitating, unless there is an unexpected recovery in the world's economic position, a continuation during the nitrate year 1931-32 of the drastic policy of restricted production now being followed. I trust that when Cosach defined its policy we shall find that Tarapaca is to be given a fair share of the nitrate exports, because there are undoubtedly a number of cheap-producing Shanks oficinas on the pampa we serve, which, it is claimed, can elaborate nitrate at a cost comparing favourably with that of oficinas on the other pampas.

Research at Sheffield University

Research work carried out in the departments of mining and fuel technology at Sheffield University is dealt with in a recent report, which states that there is increasing recognition of the need for flameproof electrical apparatus in industries other than coal-mining, where inflammable gases and vapours are likely to be encountered, and this has led to a demand for apparatus suitable for use in such gases and vapours which vary widely in their properties. Investigation has been made as to the requirements of apparatus for use in various explosive mixtures, and safe designs have been evolved for each, including paraffins, ethylene, hydrogen, coal-gas, acetylene, acetone, acetaldehyde, benzene, ether, toluene, and carbon bisulphide.

In conjunction with large-scale experiments on the low-temperature carbonisation of coal, a laboratory apparatus has been devised to yield comparable results. The series of strongly smelling coals of high carbon content have been examined in this apparatus, and the conditions (of oxidation and heat treatment) that render them suitable for the production of smokeless fuel in a commercial process has been determined. A new low-temperature assay apparatus suitable for the treatment of 200-gramme charges of coal providing a quantity of oil sufficient for analysis has also been developed.

British Association of Chemists

Notts and Derby Section

The annual general meeting was held at Derby on May 4, Mr. J. C. Hibbert (chairman of the Section) presiding. The report of the hon. secretary (Mr. T. P. Dee) for the past session recorded considerable activity and an increasing membership. The Section had taken the initiative in organising functions jointly with the local sections of the Institute of Chemistry and the Society of Chemical Industry.

Mr. C. B. Woodley, general secretary of the Association, in the course of an interesting address, said that many cases were mentioned in which the Legal Aid Department had taken up the cudgels on behalf of members; a few of these had gone to the Law Courts, and the result had always been a success for the Association, while many had been settled privately. The importance of obtaining advice before signing service agreements was stressed. Several members who had previously considered themselves in safe positions but had recently been out of employment for some time had been very grateful for the existence of the Unemployment Benefit Fund. This fund was of advantage indirectly to all, as it made it possible for members to refuse to accept positions at salaries not in keeping with the duties. Finally, Mr. Woodley commented on the good feeling which existed between the Association and the Institute of Chemistry. The meeting was followed by an informal dinner.

Chemical Trade Wages

Employees' and workers' representatives on the Chemical Trades Joint Industrial Council met in Manchester on Friday, May 8, to hear the employers' statement in explanation of their proposed reductions of wage rates affecting about 80,000 adult workers, Mr. G. W. Malcolm presiding. Mr. Lloyd Roberts presented the employers' case, and was supported by Mr. I. P. Llewellyn, Mr. J. Russell, and Lord Melchett. Mr. Charles Dukes, of the National Union of General and Municipal Workers, stated that the trade union representatives had listened with great attention to what the employers had said, but they must have an opportunity to consult their members on the proposals, and accordingly it was agreed to adjourn the meeting to Friday, May 22.

The employers' proposals are that the standard rate for labourers shall be reduced to 1s. an hour (a total reduction of about 2s. 6d. a week); that the minimum rate for shift workers should become 1s. 1d. an hour (a reduction of about 3s. 2d. a shift); that piece workers shall suffer an equivalent reduction in their full-time weekly earnings, and that the wages of youths and girls shall be proportionately reduced.

Specification for Brazing Solder

The British Engineering Standards Association has recently published a revised issue of the British Standard Specification No. 263 for Brazing Solder. This new edition has been prepared in order that an additional grade, intended primarily for solder supplied in the form of slittings and wire, might be incorporated. This grade is designated AA, and the three grades now covered by the specification are accordingly AA, A, and B. Another point of difference between the new issue and the one superseded is that the dimensions of certain of the sieves for testing granular solder have been modified so that they might be in exact agreement with the dimensions in the recently published British Standard Specification for Test Sieves (No. 410). Copies of the new specification (B.S.S. No. 263/1931) can be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Overseas Trade

The following memorandums have been isued by the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, from whom copies may be obtained on application, quoting the necessary reference:—

Egypt.—Methods of quoting and terms of payment prevailing in relation to business with Egypt. (Ref. C.X. 3500.)

Cuba.—Methods of trading and appointment of agents (Ref. C.X. 3510.)

Paraguay.—Methods of trading and appointment of agents. (Ref. C.X. 3525.)

From Week to Week

THE Broken Hill Proprietary Company, Ltd., announce that Sir W. Peter Rylands and Mr. William Royse Lysaght have been elected members of the London board.

THE Thirteenth International Sample Fair at Padua will take place in June next. The participation of British firms in this Fair would be welcomed by the organisers, Fiera di Padova, Padua, Italy.

A PAPER on the continuous production of water gas from powdered fuel was read by Dr. Adolph Thau, of Berlin, at a joint meeting of the Institute of Fuel at the Institution of Gas Engineers, held in London on Wednesday last, May 13.

THE BESSEMER gold medal of the Iron and Steel Institute has been presented to Sir Harold Carpenter. The Carnegie gold medal has been awarded to Mr. E. Valenta, of the Skoda Works, Pilsen, for his work entitled "Heat and Acid-resisting Cast Iron with High Chromium and Carbon Content."

MR. AUGUSTINE COURTAULD who has recently been rescued from the ice cap in Greenland where he was marooned as a member of the British Arctic Air Route Expedition, is a son of Mr. Samuel A. Courtauld, of Kensington, for many years a director of Courtaulds, Ltd., the artificial silk manufacturers.

NEARLY 70 members of the British Ceramic Society, which has its headquarters at the North Staffordshire Technical College, Stoke, are now on a fortnight's tour of Germany. They will visit the leading German pottery and refractory materials factories in accordance with arrangements made by the German Ceramic Society.

THE Second Spiers' Memorial Lecture of the Faraday Society will be delivered by the president, Dr. Robert L. Mond, at the Royal Institution, London, on Wednesday, June 17. The subject chosen is "Michael Faraday." Admission will be by ticket only to be obtained from the secretary of the Faraday Society, 13, South Square, Gray's Inn, London, W.C.1.

DR. G. W. MONIER-WILLIAMS has been elected chairman of the London Section (S.C.I.) in succession to Professor Morgan. The new members of the committee are Dr. J. J. Fox and Messrs. E. T. Brewis and C. E. Sage. On the motion of Mr. W. J. A. Butterfield, a cordial vote of thanks was passed to Professor Morgan for his work as chairman during the past two years and he was congratulated on being president-designate of the Society of Chemical Industry.

PURCHASING agents and buyers of leading industrial firms will hold a conference on works and factory purchasing in London on Friday, June 5. The chief speakers will be Mr. Allan R. Baker (chairman, Baker Perkins, Ltd.), Mr. E. J. Fox (managing director, Stanton Ironworks Co., Ltd.), Mr. J. Gibson Jarvie (chairman, United Dominions' Trust, Ltd.), Mr. Hugh Quigley (chief statistician, Central Electricity Board), Mr. L. H. Swinbank (controller of purchases, Imperial Chemical Industries, Ltd.), and Mr. Reginald Pugh.

THE DEPARTMENT OF OVERSEAS TRADE announce that Mr. R. Boulter, H.M. Trade Commissioner at Singapore, will shortly be in London on an official visit. Mr. Boulter will be available at the offices of the department during the period June 1 to 12 to interview manufacturers and merchants interested in the export of British goods to British Malaya. Firms desiring interviews with Mr. Boulter at the department should apply to the Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1 (quoting reference 2861/1/31).

DR. T. SLATER PRICE, F.R.S., has been appointed professor of chemistry at Heriot-Watt College, Edinburgh. Dr. Slater Price was educated at Birmingham, London, Leipzig, and Stockholm. When war broke out he was head of the chemical department of the Birmingham Technical College, and returned to that position when he was demobilised in 1919, after serving as Lieut.-Commander R.N.V.R., in charge of chemical work at the Royal Naval Experimental Station, Stratford. According to Mr. Robert Wilson, vice-chairman of the Heriot-Watt College, the special committee recommended the selection of Dr. Slater Price from the list of 42 applicants chiefly by reason of his organising experience, as the governors of the College were considering a scheme to reconstruct the chemical department.

A PURE red lead for use in paints and batteries is being prepared by a patented electrolytic process by the "Société Litharge Et Minium," of Bayonne, France.

MR. FRANK BAINBRIDGE, chief chemist to Pease and Partners, Ltd., of Skinningrove Ironworks, has been awarded the Williams Prize of the Iron and Steel Institute for research in fuel economy. The value of this prize is £100.

AT A MEETING of the chemistry and physics section of the University of Durham Philosophical Society at Armstrong College, Newcastle, on Thursday, May 7, Professor Irvine Masson read a paper on "Some Experiments in Nitration."

INTERVIEWED in Montreal on Saturday last, May 9, Sir Arthur Duckham, president-elect of the Federation of British Industries, stated that he had definitely decided to establish a branch of the Woodall-Duckham Co. in Canada.

AT THE OPENING of the conference of the Amalgamated Societies of Dyers, Bleachers, Finishers and Kindred Trades, at Blackpool on Saturday last, May 9, Mr. Ernest Wainwright, the president, said there were 46,603 unemployed in the industry—an increase of 18,471 over last year.

H. C. PUTTICK, 16, St. Helens Place, London, announces that having resigned his position with Joseph Nathan and Co., Ltd., as manager of the casein department, he is now carrying on business himself as a casein importer and exporter at the above address.

A SEMI-COMMERCIAL plant is to be built at Calgary (Canada), to test an experimental process for the extraction of benzine from the waste gas of the Turner Valley, following the result of successful experiments by Dr. E. H. Boomer, of the University of Alberta.

THE London County Council are inviting applications for the award of two Robert Blair Fellowships in applied science and technology, which are tenable in the dominions, the United States or other foreign countries. Further particulars are obtainable from the Education Officer (T.3), The County Hall, London, S.E.1.

THE Gold Medal of the Institution of Mining and Metallurgy has been awarded to Dr. Charles Camsell, Deputy Minister of Mines and Industries of the Dominion of Canada. The "Consolidated Gold Fields of South Africa, Ltd." Gold Medal has been awarded to Mr. C. W. B. Jeppe, A.R.S.M., Assoc. Inst.M.E., and the Consolidated Gold Fields Premium of 40 guineas to Mr. E. G. Lawford, A.R.S.M., Assoc.Inst. M.M.

THE annual banquet of the East End Hostels Association will take place on Tuesday, June 23. It will be held in the historic hall of the Worshipful Company of Stationers. The chair will be taken by Mr. H. Gordon Selfridge. The speakers will include Viscount Burnham, the Headmaster of Westminster School, Lieut.-Colonel John Buchan, M.P., the Earl of Feversham, and the Rt. Hon. Wedgwood Benn, M.P.

RECENT WILLS.—Sir Harold James Reckitt, director, Reckitt and Sons, Ltd., starch, blue and metal polish manufacturers, £644,607 (net personalty £383,874); Mr. Alfred Southall, of Edgbaston, Birmingham, and late of Southall Bros. and Barclay, manufacturing chemists, £38,924 (net personalty £37,321); Mr. Edward Herbert Fison, of Stoke House, Ipswich, late chairman of Joseph Fison and Co., Ltd., and of the Chemical Union, Ltd., £108,450 (net personalty £103,804).

THE FIFTH GENERAL MEETING of the Dechema, German Society for Chemical Apparatus, takes place in Vienna May 28-30. The subject under discussion is the separation of liquids and solids, and twelve papers in all are being communicated by experts in filtration problems. In addition to laboratory filtration, large scale filtration, decantation, separation by atomisation and crystallisation, classifying and flotation, and new problems in the sphere of rectification and gas purification by absorption will receive attention.

Obituary

DR. ALBERT A. MICHELSON, F.R.S., professor of physics at Chicago University since 1925, has died at Pasadena (California), aged 79. He was awarded the Nobel prize for physics in 1907, for his optical precision instruments.

DR. JOHN HASTINGS REED, late assistant chemist to the Colonial Sugar Refining Co., of Hambledon, North Queensland, Australia, aged 66.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

342,399. SOLUTIONS OF SULPHONIC ACIDS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 11, 1929.

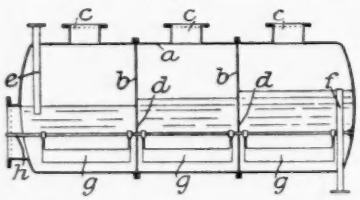
n-Butyl alcohol and naphthalene in equimolecular proportions are treated with two molecular proportions of concentrated sulphuric acid to obtain *n*-butyl-naphthalene sulphonic acid. The sodium salt is mixed with urea and dissolved in a small quantity of water. The resulting solution is miscible with water, and may be used for fire extinguishing purposes.

342,411. HYDROCARBONS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 18, 1929.

Diolefines are obtained by passing 1 : 3-dihydroxy-paraffins at a pressure of 2—20 atmospheres and temperature of 250°–400° C. over a dehydration catalyst such as phosphoric acid, red phosphorus, sodium phosphate, potash alum, aluminium oxide activated with copper sulphate, aluminium phosphate or thorium oxide. Examples are given of the treatment of 1 : 3-butylene glycol and 2-methyl-1 : 3-butylene-glycol with various catalysts, to obtain isoprene. Reference has been directed by the Comptroller to specifications 315,595, 317,500, and 329,396.

342,449. CRYSTALLISATION. E. L. R. A. Schiele and F. H. Wittenburg, 23, Pappelallee, Hamburg, and Kupferhuette Ertel, Bieber and Co. Ges., 9, Mönckebergstrasse, Hamburg. International Convention date, December 4, 1928.

Solutions are crystallised under reduced pressure in a tank *a* having partitions *b*, each compartment being connected by a



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pipe *c* to a steam jet ejector. A shaft *h* passing through the partitions carries a stirring blade *g* in each compartment. The solution is supplied through pipe *e*, and is finally drawn off by pipe *f* with the contained crystals.

342,466. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 18, 1929.

Dibenzanthrone, isodibenzanthrone and derivatives are treated with sulphur chloride in presence of a metal halide such as aluminium chloride, to obtain blue dyes for cotton. Examples are given.

342,502. ORGANIC BASE-NAPHTHOL COMPOUNDS. Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A. Assignees of S. M. Cadwell and S. I. Strickhouser, United States Rubber Co., Market St., Passaic, N.J., U.S.A. International Convention date, January 19, 1929.

α-or β-naphthol or 1 : 5-dihydroxy-naphthalene is combined with bases such as polyethylene-polyamine, diethylene-triamine, pentamethyl-diethylene-triamine, methyl-α-naphthylamine, di-α-naphthylurea, dianisidine, dibenzylaniline, β-naphthylamine, aldehyde derivatives of phenyl-α-naphthylamine, nitroso derivatives of amines, etc., to obtain products for retarding deterioration in rubber.

342,524. AMMONIUM SULPHATE. D. Tyrer, Norton Hall, The Green, Norton-on-Tees, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, January 31, 1930.

Ammonia and sulphur dioxide gases are reacted in the presence of a limited amount of water vapour, so that the product is substantially a dry powder. The reactants or the products are exposed to the action of gases containing free oxygen and nitric oxide or higher oxides of nitrogen, the latter being up to 2 per cent. of the ammonia. The partial pressures of ammonia and sulphur dioxide may be 5–10 milli-atmospheres, and the temperature 20°–50° C. The reaction chamber may be arranged above a chamber containing a series of trays over which the solid product passes while under the action of the ascending oxidising gases. The residual gases are treated with alkalies or ferrous sulphate to recover oxides of nitrogen.

342,551. DYE INTERMEDIATES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 19, 1930.

Diazotised sodium 1-amino-4-bromoanthraquinone-2-sulphonic acid is treated with copper sulphate or copper powder to obtain 1-hydroxy-4-bromoanthraquinone-2-sulphonic acid.

342,559. PHOSPHORUS AND PHOSPHORUS PENTOXIDE. Victor Chemical Works, Chicago. (Assigness of R. Weigel and H. W. Easterwood, Nashville, Tenn., U.S.A.) International Convention date, March 18, 1929.

Briquettes of a phosphorus mineral such as phosphate rock and carbonaceous material such as coke, anthracite or coal, are charged into a furnace separately with further carbonaceous material and silicious material. The total amount of silica should be in the proportion of 0·6–1·2 parts of silica to 1 part of calcium oxide. Phosphorus is volatilised and phosphorus pentoxide may be obtained.

342,601. INHIBITING THE ACTION OF SULPHURIC ACID ON METALS. Imperial Chemical Industries, Ltd., Millbank, London. From Grasselli Chemical Co., 1300, Guardian Buildings, Cleveland, Ohio, U.S.A. Application date, April 4, 1930.

Sulphuric acid employed in pickling processes is prevented from attacking metals by adding thiuram sulphide $R_2N–CS–S_x–CS–NR_2$, where R is hydrogen or a hydrocarbon radicle and *x* is a numeral.

342,611. PURIFYING SULPHUR. Ruhrgas Akt.-Ges., 60, Hewarthstrasse, Essen, Germany. International Convention date, May 1, 1929.

Sulphur and revivified gas purification material are treated first with cold benzol, toluol, or heavy benzol to dissolve the tar but not sulphur. The material is then treated with the same solvents heated above their boiling points under pressure, or with other solvents, to extract sulphur.

342,617. POTASSIUM ALUMINATE. F. Jourdan, 2, Via Pisanella, Rome. International Convention date, February 7, 1930.

Leucite is heated with limestone and ferric oxide, ground and then leached with potassium carbonate solution, the formation of insoluble calcium aluminate from any excess of lime being thus prevented.

342,634. ACRIDINES. Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A. Assignees of L. H. Howland, 6, Meade Avenue, Passaic, N.S., U.S.A. International Convention date, June 22, 1929.

A diarylamine having at least one free *o*-position in each aryl residue, *e.g.*, diphenyl-, phenyl-α-naphthyl-, phenyl-β-naphthyl-, or dinaphthyl-amine, is treated with a carboxylic acid other than formic acid, *e.g.*, acetic, butyric, isobutyric, palmitic, stearic, phenyl-acetic, or salicylic acid, or their anhydrides or acid chlorides, in the presence of a dehydrating agent such as zinc chloride. The products are meso-substituted acridines.

342,653. COLLOIDAL CARBONACEOUS SUBSTANCES. G. Antonoff, 11 bis, Avenue de Verdun, Croissy-sur-Seine, France, and J. Freedland, 46, Avenue Kléber, Paris, Application date Oct. 23, 1929.

Wood is finely divided, treated with 1–10 per cent. sulphuric acid, washed, and oxidised with nitric acid or aqua regia. The

product is wholly peptisable in ammonia and the colloidal solution is filtered and coagulated by adding acid. The coagulum is mixed with flowers of sulphur or phosphoric acid, dried, carbonised, and washed. The product is in a state of colloidal division. Other examples are given.

342,662. AMINES. Campagnie de Produits Chimiques et Electro-Metallurgiques Alais, Froges et Camargue, 23, Rue Balzac, Paris. International Convention date, January 26, 1929. Addition to 317,079.

Amines are obtained by heating a primary or secondary alcohol with ammonia or a primary amine in the presence of copper, cobalt or iron.

342,667. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, September 30, 1929.

1-Amino-4-halogen-anthraquinone-2-sulphonic acids are condensed with aromatic diamines, except *o*-diamines and *p*-phenylene-diamine and its nuclear substitution products, in which one hydrogen atom of one amino group may be replaced by an alkyl, aralkyl or hydroaromatic hydrocarbon residue, in presence of an acid-binding agent and a copper catalyst. The products dye bluish shades and several examples employing various diamines are given.

342,670. CARBOXYLIC ACIDS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 23, 1929.

Paraffin wax or other high molecular organic compound is oxidised with higher oxides of nitrogen or nitric acid, and the crude fatty acids obtained are purified by heating or distilling below 300° C. with carbon monoxide or hydrogen, in presence of a hydrogenating catalyst. The nitrogen-containing fatty acids are thereby reduced or split off. Some examples are given.

342,690. ACRIDINE DERIVATIVES. A. Carpmael, London. From I.G. Farbenindustire Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 1, 1929.

Aqueous solutions of salts of 3 : 6-diaminoacridine or 3 : 6-diamino-10-alkyl-acridinium or a double compound of these, are stabilised by adding reducing substances such as sodium bisulphite or sulphite.

342,701. CATALYTIC GASEOUS REACTIONS. O. Piette, 100, Avenue de la Toison d'Or, Brussels, and Union Chimique Belge Soc. Anon., 61, Avenue Louise, Brussels. Application date, November 4, 1929.

In catalytic gaseous reactions employing water vapour, and in which a heat exchanger is used, the water condensed from the products in the heat exchanger is used to saturate the cold gases entering the heat exchanger.

342,703. SODIUM CYANIDE. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 4, 1929.

Sodium cyanide briquettes are formed by pressing the dry salt at 50° C. and at a pressure of at least 700 kg. per sq. cm.

342,706. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt. Ges., Frankfort-on-Main, Germany. Application date, September 30, 1929.

The condensation products of 1-amino-4-halogen-anthraquinone-2-sulphonic acids and aromatic diamino compounds except *o*-diamines are treated with acylating agents in aqueous or organic solvents. Examples are given of the treatment of 1-amino-4- (*p*-aminophenyl) aminoanthraquinone-2-sulphonic acid, 1-amino-4-(*m*-aminophenyl) aminoanthraquinone-2-sulphonic acid, 1-amino-4- (*m*-ethylaminophenyl) amino-anthraquinone-2-sulpnonic acid and others.

Specifications Accepted with Date of Application

347,095. Chloro derivatives of the anthraquinone acridone series, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). November 20, 1929.

347,007. Dyestuffs, Manufacture of. Soc. of Chemical Industry in Basle. December 11, 1928.

347,098. Improving copper or copper alloys, Method of—and hardener for use therein. U. de Berker, W. Machin, W. B. O. Goudielock, and P-M-G Metal Trust, Ltd. December 12, 1929.

347,099. Vat-dyestuffs of the perylene series, Manufacture of, F. Bensa. January 9, 1929.

347,100. Vat dyestuffs, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). December 16, 1929.

347,113. Azo-dyestuffs on the fibre, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). January 20, 1930.

347,120. Dyestuffs or dyestuff intermediates, Preparation of. D. A. W. Fairweather, J. Thomas, and Scottish Dyes, Ltd October 16, 1929.

347,122, Rectification of alcohol. Soc. Anon. des Distilleries des Deux Sèvres, E. Ricard, and H. M. Guinot. November 18, 1929.

347,129. Metal oxide pigments. Goodlass Wall and Lead Industries, Ltd., and N. J. Read. January 18, 1930.

347,137. Chlorine compounds, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). January 22, 1930.

347,141. Halogenated aminoaryl thiazole compounds, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). January 22, 1930.

347,164. Mineral oil sulphonates, Process of obtaining. W. T Reddish and L. D. Myers. October 18, 1929.

347,171. 3-amino-6-halogen benzyl-ortho-benzoic acids and substitution products and derivatives, Preparation of. Newport Co. January 2, 1929. Addition to 314,804.

347,182. Dehydrating chlorides, Process of. Soc. de Produits Chimiques des Terres Rares. January 18, 1929.

347,193. Substitution products of carbazole sulphonic acids, Manufacture of. I.G. Farbenindustrie Akt.-Ges. January 23, 1929.

347,195. 1-amino-4-halogen-9-anthrones and substitution products and derivatives thereof, Preparation of. Newport Co. January 2, 1929. Addition to 340,519.

347,208. Nickel carbonyl, Production of. Mond Nickel Co., Ltd., and C. M. W. Grieb. January 16, 1930.

347,222. Refining metals and alloys of low melting points. A. Henderson. January 24, 1930.

347,223. Silica or compounds or combinations thereof, Treatment of. I. P. Llewellyn, T. J. I. Craig, A. Kirkham and P. Spence and Sons, Ltd. January 24, 1930.

347,228. Condensation products, Manufacture of. Kinstharzfabrik, Dr. F. Pollak Ges. December 21, 1929.

347,233. Dyestuffs, Production of. C. Shaw, J. Thomas and Scottish Dyes, Ltd. October 17, 1929.

347,234. Vat-dyestuffs containing halogens, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). October 24, 1929. Addition to 340,262.

347,236. Vat dyestuffs, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). November 25, 1929. Addition to 306,874.

347,239. Zinc ore, Treatment of. W. W. Triggs. (*St. Joseph Lead Co.*). December 17, 1929.

347,258. Mono-sodium glutamate and like glutamic acid salts, Manufacture of. H. D. Hardie and Co., Ltd. and A. C. Stirrat. January 23, 1930.

347,268. Absolute alcohol from unpurified spirit, Production of. G. B. Ellis. (*E Merck (Firm of)*). January 24, 1930.

347,288. Azo-dyestuffs, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). January 27, 1930.

347,290. Azo-dyestuffs containing chromium, Manufacture of. I.G. Farbenindustrie Akt.-Ges. January 27, 1930. Addition to 306,843.

347,304. Iron having special magnetic properties, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). January 30, 1930.

347,323. Acetic acid from acetaldehyde, Manufacture of. Holzverkohlungs-Industrie Akt.-Ges. February 26, 1929.

347,326. Fertilisers from superphosphate, Production of. H. Oehme and Chemische Fabrik Kalk Ges. February 7, 1929.

347,380. Non-knocking motor spirit, Production of. D. A. Howes and Imperial Chemical Industries, Ltd. February 28, 1930.

347,407. Substituted phenol carboxylic acids, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*). March 12, 1930.

347,419. Complex aluminium compounds, Manufacture of J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). March 24, 1930.

347,426. Sodium hydroxide and ammonia, Manufacture of. A. Mentzel. March 26, 1929.

347,478. Vulcanisation of rubber. B. E. Marean. April 24, 1930.

347,493. Acetylene, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt-Ges.*). May 8, 1930.

347,510. Purification of anhydrous aluminium chloride containing iron. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). May 26, 1930.

347,515. Quinoline- and acridone- compounds, Manufacture of. I.G. Farbenindustrie Akt.-Ges. June 10, 1929.

347,537. Acetylene, Apparatus for generating. I.G. Farbenindustrie Akt:-Ges. August 1, 1929.

347,543. Fatty aromatic ketones, Manufacture of. Schering Kahlbaum Akt.-Ges. July 9, 1929.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Boehringer Sohn Akt.-Ges., C. H. Production of γ-lactones of decaline. 13,647. May 8. (Germany, May 17, 1930.)
—— Production of γ-lactones of hexahydro-benzene. 13,723. May 8. (Germany, June 25, 1930.)
Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Production of dyeings. 13,152. May 4.
—— Dyeing with reserving of wool, etc. 13,262. May 5.
—— Manufacture of hydroxycarboxylic acids of amino naphthols. 13,263. May 5.
—— Vulcanisation of rubber, etc. 13,711. May 8.
Chemieverfahren Ges. Process for producing soda and potassium hydroxide. 13,233. May 5. (June 4, 1930.) (Germany, July 13, 1929.)
Coles, S. O. Cowper-. Recovery of gold from cyanide. 13,337. May 6.
Groves, W. W., and I.G. Farbenindustrie Akt.-Ges. Manufacture of cellulose esters. 13,253. May 5.
Gubelmann, I., and Tinker, J. M. 1, 2- and 2, 3-diamino anthraquinone sulphates, etc. 13,432. May 6.
I.G. Farbenindustrie Akt.-Ges. Carrying out catalytic oxidations. 13,105. May 4.
—— Manufacture of urethane derivatives. 13,378. May 6.
—— Manufacture of shaped articles. 13,663. May 8.
—— Manufacture of condensation products. 13,153. May 4. (Germany, May 6, 1930.)
—— Manufacture of non-splintering materials. 13,254. May 5. (Germany, May 5, 1930.)
—— Combustion of ammonia. 13,667. May 8. (Germany, May 9, 1930.)
Imperial Chemical Industries, Ltd., and Sexton, W. A. Manufacture of wetting, etc., agents. 13,241. May 5.
—— Fatty acid and fatty oil sulphonation products. 13,241. May 5.
—— Manufacture of dibenzyl. 13,381. May 6.
—— Manufacture of emulsifying and wetting agents. 13,382. May 6.
—— Stabilisation of chlorinated hydrocarbons. 13,568. May 7.
Mentzel, A. Production of sodium carbonate and ammonium chloride. 13,541. May 7. (Germany, May 20, 1930.)
Merck, E. (firm of), F., K, L., W. Manufacture of derivatives of chlorine type of carbamic acid, etc., acid series. 13,622. May 8. (Germany, May 8, 1930.)
Raschig Ges., Dr. F. Manufacture of phenol, etc. 13,396. May 6. (Germany, May 6, 1930.)
Rothmann, A. Production of metal, etc., complex salts of heterocyclic thiocarboxylic acids, etc. 13,287. May 5.
Schering-Kahlbaum Akt.-Ges. Manufacture of organic compounds containing sulph-hydryl group. 13,266. May 5. (Germany, May 10, 1930.)
Schotz, S. P. Production of detergents. 13,119. May 4.
—— Production of washing materials. 13,120. May 4.
—— Production of cleansing agents. 13,121. May 4.
Shaw, H. S. Hele-. Filtration. 13,600. May 8.
Smith, W. L. Solidification of carbon dioxide by oil conversion process. 13,707. May 8.
Soc. Anon. Chlorosoda. Solidification of sodium hypochlorite. 13,448. May 6. (Germany, May 26, 1930.)
Soc. des Carburants Synthétiques. Conversion of paraffins, etc., into ethelenic hydrocarbons, etc. 13,526. May 7. (France, May 21, 1930.)

Exemption of Methylene Chloride

A REPRESENTATION has been made to the Board of Trade under Section 10 (5) of the Finance Act, 1926, regarding methylene chloride, with a view to its exemption from the duty imposed by Section 1 of the Safeguarding of Industries Act, 1921, as amended by the Finance Act. Any communication on the matter should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, within one month from the date of this notice (May 6).

Economic Situation in Smyrna

H.M. VICE-CONSUL at Smyrna has prepared a report on the economic situation in the Smyrna District in 1930. A copy may be obtained on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting Ref. C. 3536.

Advice on Smoke Abatement

To the Editor of THE CHEMICAL AGE.

SIR,—At a meeting of the Institute of Fuel at the Chemical Society's Rooms, Burlington House, London, recently, it was strongly urged that those engaged in the coal trade could do much to aid smoke abatement by taking serious interest in this problem and helping to educate the users of smaller steam units to overcome the practice of smoke emission. We have on our staff a fuel combustion expert with over thirty years' experience of boiler-house practice, and it is part of his duty to assist and advise the smaller consumers of coal on how to obtain efficiency without smoke. Since in our service he has carried out many alterations and improvements in consumers' boiler-houses with resultant increase in economy and overcoming of smoke emission. We have prepared a booklet embodying the advice given, which we are shortly sending to our clients for reference purposes, and we should be pleased to forward a copy to any of your readers on application.—Yours, etc.

For JUDD, BUDD LTD.,
L. T. JUDD, Director.

Oxford House, John Street, E.C.3.
May 12.

Taxation and Research

IN a recent letter to the editor of the *Birmingham Post*, Mr. Louis Anderson Fenn, organising secretary, the Association of Scientific Workers, 25, Victoria Street, London, S.W.1, calls attention to a curious anomaly of taxation which is undoubtedly harmful to industry out of all proportion to its financial importance.

He says that when an industrial concern employs scientific men for routine testing of materials or control of processes the cost of such work is regarded as a legitimate expense of production, and is deducted, along with the other expenses, in calculating profits for purposes of income tax. When, on the other hand, a firm pays for scientific research, in the hope of improving its methods or products, the expense thus incurred is not regarded as a legitimate expense and cannot be deducted in calculating taxable profits. The effect of this anomaly is seriously to discourage technical research, in spite of its admitted importance in the recovery of trade. The handicap is the more severe because in many countries which compete with Great Britain no such anomaly exists, research being treated as a legitimate expense which is exempt from taxation.

It is difficult to say what loss of revenue would be suffered by the Treasury by the abolition of this so-called "tax on research," but any immediate loss would undoubtedly be offset at a later date by the ultimate enhanced prosperity of the industry affected.

Reconstructions at the Royal Institution

THE desirability of rebuilding a considerable part of the Royal Institution became a necessity some two years ago after explosions in Albemarle Street drew attention to the dangerous condition of the lecture theatre and the attendant fire risks. This historic room, the scene of the Friday evening discourses by Davy, Faraday and a long line of other distinguished scientific men over a period of 130 years, had hitherto remained unaltered since it was completed, under the supervision of the founder of the Institution, Count Rumford, in 1802.

The rebuilding of the lecture theatre has involved the replanning of a large adjacent part of the building. On the first floor the ante-room has been enlarged, and opening from it on the north side is the ambulatory, around which, beneath the seating of the theatre, show cases have now been arranged for the display of historic apparatus. There is also a new lecture laboratory, in which experiments are prepared for the lectures. On the ground floor, a new entrance hall has been constructed, some of the rooms have been replanned, and a large new chemical laboratory has been built.

This reconstruction scheme has been carried out by the architect to the Royal Institution, Mr. L. Rome Guthrie, F.R.I.B.A., of Wimperis, Simpson and Guthrie, 61, South Molton Street, W.1, McLellan and Partners, 32, Victoria Street, S.W.1, acting as consulting electrical engineers.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£18 15s. per ton d/d address U.K. in casks.
ACID CHROMIC.—1s. per lb., less 2½% d/d U.K.
ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.
ACID NITRIC, 80° Tw.—Spot, £20 to £25 per ton makers' works, according to district and quality.
ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.
AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K., or 8d. c.i.f. export
BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
BLEACHING POWDER, 35/37%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.
BORAX, COMMERCIAL.—Crystals, £13 10s. per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags. carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.)
CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d station in drums.
CHROMIUM OXIDE.—9d. to 9½d. per lb. according to quantity d/d U.K.
CHROMETAN.—Crystals, 3¾d. per lb. Liquor, £18 12s. 6d. per ton d/d U.K.
COPPER SULPHATE.—£25 to £25 10s. per ton.
METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 7d. to 1s. 11d. per gall.; pyridinised industrial, 1s. 9d. to 2s. 1d. per gall.; mineralised, 2s. 8d. to 2s. 11d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.
NICKEL SULPHATE.—£38 per ton d/d.
NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
POTASH CAUSTIC.—£30 to £33 per ton.
POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4½d. per lb. nett d/d U.K., discount according to quantity; ground ½d. per lb. extra.
POTASSIUM CHLORATE.—3¾d. per lb. ex-wharf, London, in cwt. kegs.
POTASSIUM CHROMATE.—8⅝d. per lb. d/d U.K., or 8d. c.i.f. export.
SALAMMONIAC.—Firsts lump, spot, £40 17s. 6d. per ton d/d address in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.
SALT CAKE, UNGROUND.—Spot, £3 10s. per ton d/d station in bulk.
SODA ASH, 58%.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.
SODA CAUSTIC, SOLID, 76/77°E.—Spot, £14 10s. per ton, d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE 97/98%.—£21 per ton.
SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.
SODIUM BICHROMATE CRYSTALS (CAKE AND POWDER)—3¼d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ¾d. per lb. extra.
SODIUM BISULPHITE POWDER, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade.
SODIUM CHLORATE.—2¾d. per lb.
SODIUM CHROMATE.—3⅜d. per lb. d/d U.K., or 3¼d. c.i.f. export.
SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.
SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.
SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d.
SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton, d/d in free drums. Crystals—Spot, £8 5s. per ton, d/d in free casks.
SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—5d. to 6½d. per lb. Crude 60's 1s. to 1s. 1d. per gall. August/December.
ACID CRESYLIC 99/100.—1s. 9d. to 1s. 10d. per gall. B.P., 3s. 6d. per gall. 97/99.—Refined, 2s. 2d. to 2s. 3d. per gall. Pale, 98%, 1s. 8d. to 1s. 9d. Dark, 1s. 4d. to 1s. 4½d.
ANTHRACENE OIL, STRAINED (GREEN OIL).—4½d. to 4¾d. per gall.
BENZOLE.—Prices at works: Crude, 7½d. to 8½d. per gall.; Standard Motor, 1s. 2d. to 1s. 3d. per gall. 90%.—1s. 3d. to 1s. 4d. per gall. Pure, 1s. 6d. to 1s 7d. per gall.
TOLUOLE.—90%, 1s. 9d. to 1s. 10d. per gall. Pure, 1s. 11d. to 2s. per gall.
XYLOL.—1s. 8d. to 1s. 9d. per gall. Pure, 1s. 10d to 1s. 11d. per gall.
CREOSOTE.—Standard specification, for export, 5dd. to 5¼d. net per gall. f.o.b.; for Home, 4d. per gall. d/d.
NAPHTHA.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent, 90/190, 1s. to 1s. 2d. per gall.
NAPHTHALENE.—Purified Crystals, £11 11s. per ton.
PITCH.—Medium soft, 45s. per ton, in bulk at makers' works.
PYRIDINE.—90/140, 3s. 3d. to 3s. 6d. per gall. 90/160, 3s. 3d. to 3s. 6d. per gall. 90/180, 1s. 9d. to 2s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—
ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.
ACID ANTHRANILIC.—6s. per lb. 100%.
ACID GAMMA.—Spot, 3s. 3d. per lb. 100% d/d buyer's works.
ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works.
ACID NEVILLE AND WINTHER.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
ACID SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.
BENZIDINE BASE.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.
BENZOIC ACID.—Spot, 1s. 8½d. per lb. d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL 34·5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. 5d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.
DINITROBENZENE.—7½d. per lb.
DINITROCHLORBENZENE.—£74 per ton d/d.
DINITROTOLUENE.—48/50° C., 7d. per lb.; 66/68° C., 7½d. per lb.
DIPHENYLAMINE.—Spot, 1s. 8d. per lb. d/d buyer s works.
a-NAPHTHOL.—Spot, 1s. 9d. per lb. d/d buyer's works.
B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.
a-NAPHTHYLAMINE.—Spot, 10½d. per lb. d/d buyer's works.
B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 6½d. per lb., 5-cwt. lots, drums extra, d/d buyer's works.
NITRONAPHTHALENE.—8¾d. per lb.
R. SALT.—Spot, 2s. per lb. 100% d/d buyer's works.
SODIUM NAPHTHIONATE.—Spot, 1s. 6d. per lb. 100% d/d buyer's works.
o-TOLUIDINE.—Spot, 8d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 6d. per lb. d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 3d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 5s. to £7 10s. per ton. Grey, £13 per ton. Liquor, 9d. per gall.
ACETONE.—£63 to £65 per ton.
CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.
IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gall.
RED LIQUOR.—16° Tw., 8½d. to 10d. per gall.
WOOD CREOSOTE.—1s. 9d. per gall., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 9d. to 2s. 11s. per gall., according to quantity. Solvent, 3s. 9d. per gall.
WOOD TAR.—£4 to £5 per ton.
BROWN SUGAR OF LEAD.—£32 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 1d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.
ARSENIC SULPHIDE, YELLOW.—1s. 7d. to 1s. 9d. per lb.
BARYTES.—£6 to £7 10s. per ton, according to quality.
CADMIUM SULPHIDE.—4s. 6d. to 5s. per lb.
CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.
CARBON BLACK.—3d. to 4d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity: drums extra.
CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 6d. per lb.
INDIARUBBER SUBSTITUTES, WHITE.—4⅝d. to 5⅛d. per lb.; Dark, 4⅛d. to 4⅞d. per lb.
LAMP BLACK.—£28 per ton, barrels free.
LITHOPONE, 30%.—£19 to £21 per ton.
SULPHUR.—£9 10s. to £13 per ton, according to quality.
SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.
SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.
VERMILION, PALE OR DEEP.—6s. 6d.–7s. per lb.
ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACETANILIDE.—1s. 4d. per lb. for 1-cwt. lots.
ACID, ACETIC, PURE, 80%.—£37 5s. per ton d/d address U.K. in casks.
ACID, ACETYL SALICYLIC.—2s. 7d. to 2s. 9d. per lb., according to quantity.
ACID, BENZOIC B.P.—1s. 10d. per lb., for synthetic product. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. per lb., less 5%.
ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ¼-cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—7s. 6d. per lb. for 28-lb. lots. Resublimed, 8s. 6d. per lb. for 28-lb. lots.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—11⅞d. per lb., less 5%.
AMIDOL.—7s. 6d. to 11s. 3d. per lb., according to quantity.
AMMONIUM BENZOATE.—3s. 6d. per lb.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5-cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼-cwt. lots. Packages extra. Special prices for quantities and contracts.
ARGENT. NITRAS, CRYSTALS.—1s. 1d. per oz.
ATROPHINE SULPHATE.—7s. to 7s. 6d. per oz., according to quantity.
BARBITONE.—5s. 9d. to 6s. per lb.
BISMUTH CARBONATE.—6s. 9d. per lb.
BISMUTH CITRATE.—8s. per lb.
BISMUTH SALICYLATE.—7s. 3d. per lb.
BISMUTH SUBNITRATE.—6s. per lb.
BISMUTH NITRATE.—Cryst. 5s. per lb.
BISMUTH OXIDE.—9s. 10d. per lb.
BISMUTH SUBCHLORIDE.—9s. 7d. per lb.
BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. o½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb. Liquor Bismuth B.P., in W. Qts., 1s. 2d. per lb.; 6 W. Qts., 11½d. per lb.; 12 W. Qts., 10d. per lb.; 36 W. Qts., 9½d. per lb.
BORAX B.P.—Crystal, £21 10s. per ton; powder, £22 per ton; for one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 4½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 7d. per lb. Prices for 1-cwt. lots.
CAFFEIN, PURE.—6s. 6d. per lb.
CAFFEIN CITRAS.—5s. per lb.
CALCIUM LACTATE.—B.P., 1s. to 1s. 6d. per lb., according to quantity.
CAMPHOR.—Refined flowers, 2s. 10d. to 3s. per lb., according to quantity; also special contract prices.
CHLOROFORM.—2s. 3d. per lb., according to quantity.
EPHEDRINE, PURE.—12s. 6d. to 13s. 6d. per oz.
ERGOSTEROL.—2s. 6d. per gm.
ETHERS.—S.G. ·730—1s. to 1s. 1d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—30s. per cwt., in barrels, ex wharf.
GLUCOSE, MEDICINAL.—1s. 6d. to 2s. per lb. for large quantities.
HEXAMINE.—1s. 10d. to 2s. per lb., according to quantity.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 11d. to 3s. 4d. per lb.; potassium, 3s. 2d. to 3s. 7d. per lb.; sodium, 3s. 1d. to 3s. 6d. per lb.; for 28-lb. lots.
IRON AMMONIUM CITRATE.—B.P., 1s. 11d. per lb., for 28-lb. lots. Green, 2s. 6d. per lb., list price. U.S.P., 2s. 9d. per lb. list price.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8½d. to 8¾d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light B.P., 36s. per cwt.
MAGNESIUM OXIDE.—Light Commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 14s. per lb. net; Synthetic, 8s. 6d. to 12s. per lb.; Synthetic detached crystals, 8s. 6d. to 10s. per lb., according to quantity; Liquid (95%), 9s. per lb
MERCURIALS B.P.—Up to 1-cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.
PARAFORMALDEHYDE.—1s. 6d. per lb.
PARALDEHYDE.—1s. 1d. per lb.
PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
PHENOLPHTHALEIN.—5s. to 5s. 2½d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—82s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P., 1s. 9d. per lb. for 28-lb. lots.
POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125-lb. kegs.
POTASSIUM IODIDE.—16s. 8d. to 17s. 9d. per lb., as to quantity.
POTASSIUM METABISULPHITE.—50s. per cwt. d/d London, kegs free.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. per oz. for 1,000-oz. lots.
SACCHARIN.—43s. 6d. per lb.
SALICIN.—16s. 6d. to 17s. 6d. per lb., according to quantity.
SANTONIN.—£50 per kilo for 5-kilo lots.
SILVER NITRATE.—10d. per oz. for 500-oz. lots, sticks, 2d. per oz. extra.
SODIUM BARBITONUM.—8s. 6d. to 9s. per lb. for 1-cwt. lots.
SODIUM BENZOATE B.P.—1s. 6½d. to 1s. 7d. per lb.
SODIUM CITRATE.—B.P.C. 1911, 1s. 6d. per lb. B.P.C. 1923, and U.S.P., 1s. 10d. per lb. for 28-lb. lots.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—80s. per cwt. net, ton lots, d/s of 5 cwt. Crystals, 2s. 6d. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£26 to £28 per ton, according to quantity. Delivered U.K.
STRYCHNINE, ALKALOID CRYSTAL, 2s. per oz.; hydrochloride, 1s. 9½d. per oz.; nitrate, 1s. 8d. per oz.; sulphate, 1s. 9d. per oz., for 1,000-oz. quantities.
TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
THYMOL.—Puriss, 6s. to 7s. per lb., according to quantity Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—9s. per lb.
AMYL ACETATE.—2s. 3d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL CINNAMIC ALDEHYDE.—9s. per lb.
AMYL SALICYLATE.—2s. 6d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 9d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 9d. per lb.
BENZYL BENZOATE.—2s. 2d. per lb.
CINNAMIC ALDEHYDE NATURAL.—11s. 9d. per lb.
COUMARIN.—12s. per lb.
CITRONELLOL.—6s. 6d. per lb.
CITRAL.—6s. 6d. per lb.
ETHYL CINNAMATE.—6s. 9d. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—8s. 6d. per lb.
GERANIOL.—6s. to 10s. per lb.
HELIOTROPINE.—5s. 6d. per lb.
ISO EUGENOL.—10s. 6d. per lb.
LINALYL ACETATE, EX BOIS DE ROSE.—7s. 6d. per lb. Ex Shui Oil, 7s. 6d. per lb.
METHYL ANTHRANILATE.—6s. 3d. per lb.
METHYL BENZOATE.—4s. 3d. per lb.
MUSK XYLOL.—6s. 6d. per lb.
PHENYL ETHYL ACETATE.—10s. per lb.
PHENYL ETHYL ALCOHOL.—8s. 3d. per lb.
RHODINOL.—40s. per lb.
SAFROL—1s. 6d. per lb.
VANILLIN, EX CLOVE OIL.—14s. 6d. to 16s. 6d. per lb. Ex Guaiacol.—13s. to 15s. per lb.

Essential Oils

ANISE OIL.—2s. 6d. per lb.
BERGAMOT OIL.—8s. 3d. per lb.
BOURBON GERANIUM OIL.—18s. per lb.
CAMPHOR OIL.—White, 2s. per lb.; Brown, 1s. 6d. per lb.
CANANGA.—Java, 8s. per lb.
CINNAMON OIL LEAF.—4s. 6d. per oz.
CITRONELLA OIL.—Java, 2s. 3d. per lb., c.i.f. Pure Ceylon, 2s. 10d. per lb.
CLOVE OIL, 90/92%.—6s. 6d. per lb.
EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%—1s. 7d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 8s. 6d. per lb.
LEMON OIL.—4s. per lb.
OTTO OF ROSE.—Anatolian, 45s. per oz.; Bulgarian, 80s. per oz.
PALMA ROSA.—9s. 6d. per lb.
PEPPERMINT OIL.—Wayne County, 8s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, May 12, 1931.

A MODERATE volume of business is coming to hand with prices continuing steady.

General Chemicals

ACETONE.—A regular inquiry is being received with the price steady at £60 to £65 per ton according to quantity.

ACID ACETIC.—Unchanged at £36 5s. to £38 5s. per ton for technical 80% and £37 5s. to £39 5s. per ton for pure 80% with a satisfactory demand.

ACID CITRIC.—Slow of sale and price easy at about 1s. 0½d. per lb., less 5%.

ACID FORMIC.—Rather more business is being placed for this product and at £38 per ton the market is steady.

ACID LACTIC.—Unchanged at £39 per ton for 50% by weight pale technical quality, with a steady demand.

ACID OXALIC.—There has been a brisk demand for this product with price firm at £30 7s. 6d. to £32 per ton according to quantity.

ACID TARTARIC.—Unchanged at about 11½d. per lb., less 5%, with a small business passing.

ALUMINA SULPHATE.—Is in better request at £7 15s. to £8 5s. per ton for the 17/18% iron free quality.

ARSENIC.—Demand is not quite so active and price is firm at £19 to £19 10s. per ton, with material in better supply.

CREAM OF TARTAR.—A small trade has been booked at about 81s. per cwt., ex warehouse London.

COPPER SULPHATE.—In rather better demand at about £21 to £21 10s. per ton, less 5%, free on rails London.

FORMALDEHYDE.—In regular demand at about £29 10s. per ton.

LEAD ACETATE.—A small trade has been done at about £32 5s. per ton for white and £31 5s. for brown.

LEAD NITRATE.—In fair request at £28 10s. per ton.

LITHOPONE.—Quoted unchanged at £18 to £22 per ton, according to grade and quantity, with a fairly satisfactory demand.

POTASSIUM BICHROMATE.—Maintained at 4¼d. per lb. with a fair demand.

POTASSIUM CHLORATE.—The market is firm at £28 to £32 per ton, according to quantity and there is a broadening demand.

PERMANGANATE OF POTASH.—Needle crystals B.P. quoted at 5¼d. to 5½d. per lb., ex warehouse, and in steady call.

SODIUM BICHROMATE.—Maintained at 3½d. per lb. with discounts for contracts, and there is a fair trade passing.

SODIUM HYPOSULPHITE.—Photographic crystals in better demand at £14 5s. per ton, with commercial quality slow at about £8 10s. per ton.

SODIUM PRUSSIATE.—In steady request at 4¾d. to 5d. per lb. at which price the market rules firm.

TARTAR EMETIC.—Rather better inquiry and price is steady at 10¾d. per lb.

ZINC SULPHATE.—Unchanged and in fair request at about £11 per ton.

Coal Tar Products

THE market for coal tar products remains quiet, and prices are unchanged from last week.

MOTOR BENZOL.—Remains at 1s. 4½d. to 1s. 5½d. per gallon f.o.r.

SOLVENT NAPHTHA.—Quoted at 1s. 1½d. to 1s. 2d. per gallon f.o.r.

HEAVY NAPHTHA.—Obtainable at 11d. to 1s. 0½d. per gallon f.o.r.

CREOSOTE OIL.—Unchanged at about 3d. to 3½d. per gallon f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at about 1s. 8d. per gallon for the 98/100% quality, and at about 1s. 6d. per gallon for the dark quality 95/97%.

NAPHTHALENES.—Unchanged at £3 10s. to £3 15s. per ton for the firelighter quality; at £4 to £4 5s. per ton for the 74/76 quality; and at about £5 per ton for the 76/78 quality.

PITCH.—Weaker for forward delivery, at 35s. to 37s. 6d. per ton, f.o.b. East Coast port.

Nitrogen Fertilisers

Sulphate of Ammonia.—Export.—There is no change to report. The market continues quiet and prices remain steady at £7 per ton f.o.b. U.K. port in single bags for neutral quality 20·6% nitrogen. It is understood that from time to time small lots of ordinary quality are available at prices lower than this. The consuming season on the Continent has shown a considerable diminution in the consumption from the figures in the last two years. *Home.*—The present home prices of £9 10s., delivered to farmers' stations, in six ton lots, remains in operation until the end of June. As the season is a late one merchants report that buying continues in many parts of the country. The volume of business has, of course, diminished from the high level of a month ago.

Nitrate of Soda.—There is nothing further to report.

Latest Oil Prices

LONDON, May 13.—LINSEED OIL was dull, and 7s. 6d. to 10s. decline. Spot, £17 5s.; May, £15 7s. 6d.; June/August, £15 10s.; and September/December, £16 5s., naked. RAPE OIL was dull. Crude extracted, £28 10s.; technical refined, £30 naked, ex wharf, COTTON OIL was quiet. Egyptian crude, £19 10s.; refined common edible, £23 10s.; and deodorised, £25 10s., naked, ex mill. TURPENTINE was steady, unchanged. American, spot, and June, 44s. 3d.; July/December, 43s. per cwt.

HULL.—LINSEED OIL.—Spot and afloat, £16; July/August, £16 5s.; September/December, £16 10s. per ton, naked. COTTON OIL.—Bombay, crude, spot, £18 15s.; Egyptian, crude, spot, £19 10s.; edible refined, spot, £22 5s.; technical, spot, £21 15s.; deodorised, £24 5s. per ton. CASTOR OIL.—Pharmacy, spot, 40s.; first, 35s.; second, 33s. per cwt. PALM KERNEL OIL.—Crude, f.m.q., spot, £21 10s. per ton, naked. GROUNDNUT OIL.—Crushed/extracted, spot, £23 10s.; deodorised, £27 10s. per ton. SOYA OIL.—Crushed/extracted, spot, £18 10s.; deodorised, £22 per ton. RAPE OIL.—Crushed/extracted, spot, £28; refined, £30 per ton. COD OIL, 20s. per cwt.

South Wales By-Products

THERE is scarcely any change in South Wales by-product activities. Pitch continues to have a slow and sporadic call, with prices unchanged and supplies well in excess of demand. The big pitch users, especially the patent fuel manufacturers, are confining their buying to parcels for immediate delivery, and, unless there is an unexpected improvement in the patent fuel exports, it is unlikely that there will be any improvement in the pitch demand for some time to come. Road tar has a fair call round about 13s. per 40-gallon barrel. A similar remark applies to refined tars, with quotations for coke-oven and gasworks tar unchanged. Naphthas have a slow, small market, but creosote is slightly stronger. Motor benzol is in fair, steady request. Patent fuel prices, for export, are:—20s. 6d. to 21s., ex-ship Cardiff; 19s. 6d. to 20s., ex-ship Swansea. Coke prices are:—Best foundry, 34s. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace, 16s. 6d. to 17s. 6d.

Scottish Coal Tar Products

DELIVERIES ex contract are proceeding regularly but new business is rather scarce particularly for forward delivery. Makers' quotations for cresylic acid are lower.

Cresylic Acid.—Competition is keen and values are lower as follows:—Pale, 99/100%, 1s. 4½d. to 1s. 5½d. per gallon; pale, 97/99%, 1s. 2½d. to 1s. 3½d. per gallon; dark, 97/99%, 1s. 1½d. to 1s. 2½d. per gallon; all f.o.r. in bulk. High boiling is unchanged at 1s. 8d. to 1s. 9d. per gallon.

Carbolic Sixties.—Stocks are high and prices are easy at 1s. 2d. to 1s. 4d. per gallon, according to quality.

Creosote Oil.—Production being under normal there is a fair demand for available supplies of the best grades. Specification oils, 2½d. to 3d. per gallon; gasworks ordinary, 3½d. to 3¾d. per gallon; washed oil, 3¾d. to 3½d. per gallon; all ex makers' works.

Coal Tar Pitch.—Small quantities are being placed for home consumption at about 37s. 6d. per ton ex works. Export price is nominal at 37s. 6d. per ton, f.a.s. Glasgow.

Blast Furnace Pitch.—Trading is spasmodic. Controlled prices are unchanged at 30s. per ton f.o.r. works for home trade, and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—Deliveries are proceeding in large quantities, but prices continue low at 2½d. to 2¾d. per gallon f.o.r. in buyers' packages.

Blast Furnace Tar.—Very dull at 2¾d. per gallon f.o.r.

Crude Naphtha.—Available supplies are in fair demand at 4½d. to 5¼d. per gallon, according to quality.

Water White Products.—Few orders are being placed. Motor benzol is about 1s. 4d. to 1s. 5d. per gallon; 90/160 solvent, 1s. 3d. to 1s. 4d. per gallon, and 90/190 heavy solvent, 1s. 1d. to 1s. 2d. per gallon; all ex makers' works in bulk.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, May 12, 1931.

THE Scottish heavy chemical market shows steady improvement and business generally is brighter.

Industrial Chemicals

ACETONE.—B.G.S.—£60 to £63 per ton, ex wharf, according to quantity.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £47 to £58 per ton; pure, £37 5s. per ton; technical, 80%, £36 5s., delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £22 per ton; crystals, £23 per ton; B.P. crystals, £31 per ton; B.P. powder, £32 per ton, in 1-cwt. bags, delivered Great Britain free in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at 3½d. per lb., ex store. On offer from the Continent at 3¾d. per lb., ex wharf.

ACID, SULPHURIC.—£3 7s. 6d. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 1s. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 11⅜d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted round about £8 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 10s. per ton., c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £24 per ton, ex wharf. On offer for shipment from China at about £23 per ton, c.i.f. U.K.

ARSENIC, WHITE POWDERED.—Quoted £22 10s. per ton, ex wharf. Spot material still on offer at £22 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £9 10s. per ton, c.i.f. U.K. ports. For Continental materials our price would be £8 10s. per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 7s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £30 10s. per ton, ex store. Continental on offer at about £29 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £30 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £42 per ton, carriage paid.

LEAD ACETATE.—White crystals quoted round about £33 to £34 per ton c.i.f. U.K. ports. Brown on offer at about £1 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £9 10s. per ton, ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p. quoted 1s. 8d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4¼d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer, £25 10s. per ton ex store. Offered from the Continent at £24 15s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99½/100% POWDER.—Quoted £29 per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb. ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums; all carriage paid buyer's station, minimum four-ton lots; for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3½d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Chilean producers now offer at £10 per ton, carriage paid, buyer's sidings, minimum six-ton lots.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £8 10s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £18 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

An Analyst's Mistake

Claim for Recompense by London Firm

AT a recent meeting of the Fermanagh County Council (Ireland), a letter was read from Drysdale, Dennison and Co., wholesale spice merchants, London, putting forward the following statement:—

"Your public analyst has admitted that in our own and other cases he made a mistake. We do not propose to dwell on the enormous discrepancy between his results and those of the Government and our own experts, with the facts of which you are, we understand, quite familiar. As far as we are concerned, this mistake has cost us a considerable sum of money, and we desire to put it before your Council that it is due to us that recompense for the sum of money, which we have expended through an admitted mistake of your official, should be made to us."

The letter is the outcome of an error which resulted in several pepper grinders being prosecuted in respect of what was alleged to be adulterated pepper. On examination by other analysts, however, it was discovered that some error had been made and the cases were dismissed.

At the meeting at which the above letter was read, the question of recompense to Drysdale, Dennison and Co. was referred to the Council's solicitor for report to the Finance Committee.

International Leather Trades Chemists

AN extra meeting of the British Section of the International Society of Leather Trades Chemists is to be held at the Leathersellers' College, 176, Tower Bridge Road, London, to-day, at 10 a.m. The following papers will be read: "The silver method of determining glucose," by D. Woodroffe and S. A. Rundle; "Notes on deterioration of leather," by D. Woodroffe and S. A. Wallington; and "The determination of sulphuric acid in vegetable leather" (diagramatic representation of results by the difference figure method), by R. F. Innes. There will also be demonstrations of the flexometer, euscope, and ultra violet light fading lamp.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, May 14, 1931.

At the moment any indication on the chemical market here for products to find lower levels is confined to one or two lines, such as sulphate of copper and the lead products, which are weakening in sympathy with the continued slump in the metals. In most other respects the market keeps steady to firm. There has been no freer disposition so far as actual new bookings are concerned for buyers to enter into commitments much in advance of requirements, and the bulk of the business reported during the past week has related to comparatively small parcels, most of them for immediate or early delivery dates.

Heavy Chemicals

Hyposulphite of soda is steady at round £9 per ton for the commercial quality and £15 5s. for the photographic, and a moderate movement to the material is reported. Bichromate of soda is maintained on the basis of 3½d. per lb., less 1 to 2½ per cent., according to quantity, a quiet business having been put through this week. Current offers of diphosphate of soda are at up to £10 10s. per ton, with the demand on relatively slow lines. Saltcake is in fair request and values in this section are firm at up to £3 per ton. There is a moderate demand about n the case of prussiate of soda and prices are well held at from 4¾d. to 5¼d. per lb., according to quantity. Alkali is firm and in fair request at round £6 per ton, with bicarbonate of soda in somewhat similar position at about £10 10s. The demand for caustic soda against old contracts is said to be reasonably satisfactory and quotations are firm, the basis of contract offers being from £12 15s. to £14 per ton, according to grade. Only a quiet trade has been done this week in the case of sulphide of sodium and the undertone in this section is not too strong; the 60–65 per cent. concentrated solid quality is on offer at about £9 per ton and the commercial material at £8. Chlorate of soda is steady at about £26 10s. per ton, a moderate amount of business being done.

Yellow prussiate of potash shows no alteration so far as values are concerned, current offers ranging from 6¾d. to 7¼d. per lb., according to quantity, with buying interest on a moderate scale. Only a quiet demand is reported in respect of permanganate of potash, offers of which are at round 5½d. per lb. for the B.P. material and 5¼d. for the commercial quality. Caustic potash is in quiet request and prices are fairly steady at from £28 10s. to £29 per ton. Carbonate of potash continues to be quoted in the neighbourhood of £25 per ton, with sales this week on a moderate scale. Bichromate of potash meets with a quiet demand at 4¼d. per lb., less 1 to 2½ per cent., with chlorate in like position and prices maintained at about £27 10s. per ton.

Sulphate of copper has not yet apparently touched bottom and supplies this week have been readily offered at about £19 per ton, f.o.b., with no big response on the part of buyers. Arsenic is still in comparatively short supply and quotations are well held at about £19 10s. per ton at the mines for white powdered, Cornish makes. Only a quiet business is offering in the case of the lead products, values of which are easy in tendency at round £32 10s. per ton for white acetate and £31 10s. for brown, with nitrate on offer at £29. The acetates of lime are not actually lower on balance, but steadiness is still lacking in this section, the grey quality being on offer at round £12 5s. per ton and the brown at £7 5s.

Acids and Tar Products

Tartaric acid seems to be fairly steady at round 11¼d. per lb., with a quiet trade reported. Citric acid, however, is easing off still, to-day's prices being no better than about 1s. per lb. Oxalic acid is in moderate demand at round £1 12s. per cwt., ex store. There is a fair inquiry about for acetic acid, and quotations are well held at £51 per ton for the technical glacial quality and £37 per ton for the 80 per cent. commercial.

A quiet business over next season is being done in pitch at round 37s. per ton, f.o.b. The demand for creosote oil is quiet all round, with offers at from about 3d. to 3¾d. per gallon, naked, according to quality. Carbolic acid sales are of moderate extent, with crude quoted at about 1s. 1½d. per gallon, naked, and crystals at 5¼d. per lb., f.o.b. Solvent naphtha is selling at round 1s. 2¾d. per gallon.

Company News

Tate and Lyle, Ltd.—An interim dividend of 4 per cent., less tax, is announced on the 3,400,000 £1 ordinary shares.

American Smelting and Refining Co.—A quarterly dividend of $1 per share has been declared payable on the common stock.

Richard Johnson and Nephew.—The profit for the year ended March 31 was £31,915 and £16,370 was brought forward. A dividend of 5 per cent. is paid on the ordinary shares, and £20,384 is carried forward.

British Alizarine Co.—For the year 1930 the report states that the amount brought forward was £52,489. To this is added the profit for the year £9,566, making £62,055. The directors have written off £20,000 for depreciation and recommend that the balance of £42,055 be carried forward.

Alex Pirie and Sons.—The balance at the credit of profit and loss account for the year 1930, including £19,741 brought forward, was £105,276. A final dividend of 5 5-6th per cent. is to be paid on the ordinary shares, making 8¾ per cent. for the year; to depreciation reserve is placed £8,000, carrying forward £19,776.

Breda Co.—The annual report shows a gross profit of 2,670,000 florins, against 4,420,000 florins in the previous year, and a net profit of 1,400,000 florins, against 3,060,000 florins. The profit will be applied to depreciation, and the reserved profit of 1929, amounting to 649,811 florins, will be applied to writing down the book value of stocks.

Benzol and By-Products.—The report for the year to September 30, 1930, states that arrangements are under consideration for dealing with the profit and loss debit outstanding of £108,224 and for provision of additional working capital. The loss for the year, after making full allowance for depreciation, management and all other expenses, amounted to £2,165, and the debit brought in was £25,667. After adding loss for the year, transfer to sinking fund, £521, depreciation reserve for investments, £21,528; loan to subsidiary company £52,270, shares in subsidiary company £10,000; and deducting surrender value of sinking fund policy and sale of "Ajax" trade-mark, £3,927, the debit balance is brought up to £108,224.

United Premier Oil and Cake Co.—The balance to credit of revenue account on December 31, 1929, according to the report for 1930, is stated to be £26,495, to which is added the balance of revenue as shown on the current account amounting to £18,854, making £45,349. From this is to be deducted debenture interest £19,940, and dividend on the preference shares for the half-year to June 30, 1930, leaving a balance of £8,194. Owing to arrangements made for the management of certain of the subsidiary companies as from January 1, 1930, the accounts are submitted on a different basis from that of previous years. The result shown in the revenue account, after payment of debenture interest, is a loss of £1,086, but, in addition, there are balances for net losses in subsidiary companies in previous years amounting to £83,444, against which reserve of £65,955 has been provided, leaving deficiency of £17,489, subject to carry-forward to credit of revenue account of £8,194.

Artificial Fertiliser Consumption in Czechoslovakia

According to figures published by the Czechoslovak State Statistical Office, the consumption of artificial fertilisers during the second quarter of the agricultural year, that is, from February 1 to April 30, was as follows (one quintal = 220·46 lb.):—

Kind of Fertiliser.	Consumption (in Quintals).
Ammonium sulphate	242,502
Chile saltpetre	90,501
Lime saltpetre	38,485
Superphosphates	862,629
Nitrogenous lime	166,274
Thomas meal	325,511
Bone meal	29,639
Kainit	123,970
Potash salts 18-24 per cent.	6,961
Potash salts 38-44 per cent.	338,360
Other salts	311
Other fertilisers	404
Animal waste	10,940

Tariff Changes

POLAND.—The Commercial Secretary to H.M. Embassy at Warsaw reports that import duties on certain chemicals imported into Poland have been amended as follows:—

	Import duty in zloty per 100 kilo. Formerly.	Now.
Nitrate of ammonia	27	27
Note.—Nitrate of ammonia under permit from the Ministry of Finance	—	Free
Sulphate of ammonia	16·20	25
Note.—Sulphate of ammonia and its compounds with nitrate of ammonia, imported for agricultural purposes, under permit from the Ministry of Finance	Free	Free
Saltpetre:—		
(1) Chile saltpetre (with traces of iodine)	10	25
(2) Nitrate of sodium, refined and synthetic	14·30	25
(3) Nitrate of calcium	6·50	25
(4) Nitrate of potassium	15·60	25
(5) Calcium cyanamide	5	25
Note 1.—The articles enumerated in this item, and their compounds with other materials, imported for agricultural purposes, under permit from the Ministry of Finance	—	Free
Note 2.—The articles enumerated in sections 1, 2 and 4 of this item, imported for industrial purposes, under permit from the Ministry of Finance	—	Free

Only Chile saltpetre and nitrate of calcium containing up to 8 per cent. of nitrate of ammonia were formerly allowed to be imported free of duty under permit from the Ministry of Finance.

UNITED STATES.—The United States Tariff Commission have given notice that pursuant to Section 336 of the Tariff Act of 1930, a public hearing in respect of non-edible gelatin, glue, glue size, and fish glue, not specially provided for, and casein glue, will be held at the office of the United States Tariff Commission in Washington, on May 28, at which time and place all parties interested will be given opportunity to be heard.

ITALY.—A Ministerial Decree, dated April 8, provides that artificial resinous products, of the albertol type, not apt to become hard, for use in the preparation of varnishes, are to be assimilated, for Customs purposes, to "organic chemical products, not specially mentioned" (Tariff No. 769). The duty payable under this classification is 143 lire (paper) per 100 kilogs.

NIGERIA.—Order-in-Council No. 10 of 1931, made under the Dangerous Drugs Ordinance, 1927, prohibits the import into or export from Nigeria (except under licence) of di-hydro-morphinone and its salts and any preparation containing di-hydro-morphinone.

Insecticides in India

ACCORDING to the United States Consul at Calcutta, there is a fairly large market in India for household insecticides, although this market is not as large as one would expect from the size and population of the country. The sales of insecticides are nevertheless increasing and there are already a number of brands established in the market. Quite recently, however, insecticides manufactured in India are having a good sale, especially because they are lower in price than the imported article, and secondly on account of the tendency to patronise local products. Competition, therefore, is keen, but it is believed that it offers attractive possibilities.

Cod Liver Oil in Norway

ATTEMPTS are being made to improve the taste and quality of Norwegian cod liver oil. One firm in Norway advertises the oil combined with concentrated fruit juice, giving an orange flavour. At the same time, experiments are being made at the State Vitamin Institute to perfect methods of testing and controlling the quality and vitamin content of the oil. The bottling and labelling of cod liver oil before shipment from Norway is now done to some extent in order to preclude any possibility of diluting or misrepresenting the quality of the oil after it has left the country.

Commercial Intelligence

The ***following are taken from printed reports, but we cannot be responsible for any errors that may occur.***

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ILLINGWORTH CARBONIZATION CO., LTD., Manchester. (M., 16/5/31.) Registered April 30, series of £50,000 (not ex.) debentures, present issue £6,000; general charge. *Nil. January 2, 1931.

METALS COATING CO., LTD., London, E.C. (M., 16/5/31.) Registered April 30. £2,700 debenture to Pool's Advertising Service, Ltd., 180, Fleet Street, E.C.; general charge. *Nil. December 31, 1930.

MINERAL OILS EXTRACTION, LTD. (late MINERAL OILS SEPARATION, LTD.), London, E.C. (M., 16/5/31.) Registered April 2, debenture securing moneys owing and all sums advanced by the holders, Goliath Portland Cement Co. Ltd., Railton, Latrobe, Tasmania; charged on undertaking and goodwill of the business and all property and assets present and future situate in Tasmania. *Nil. December 5, 1930.

RIO TINTO CO., LTD., London, E.C., mining company. (M. 16/5/31.) Registered April 30, £2,000,000 debenture stock (secured by Trust Deed dated April 9, 1931); general charge. *Nil. April 28, 1930.

London Gazette, &c.

Companies Winding Up Voluntarily

PURE CANE MOLASSES CO., LTD. (C.W.U.V., 16/5/31.) Creditors' claims to James Don, of Bush House, Aldwych, London, W.C.2, the liquidator of the company, by June 30.

BRITISH MOLASSES CO., LTD. (C.W.U.V., 16/5/31.) Creditors' claims to James Don, of Bush House, Aldwych, London, W.C.2, liquidator of the company, by June 30.

New Companies Registered

MAXENT CHEMICAL CO., LTD., 109, Colmore Row, Birmingham. Registered May 4. Nominal capital, £100 in £1 shares. Wholesale and manufacturing chemists and druggists, etc. Directors: M. A. J. M. St. Ludger, J. M. McKenzie.

PORTLAND CHEMICAL CO., LTD., 61/2, Chancery Lane, London, W.C.2. Registered May 8. Nominal capital, £500 in £1 shares. Manufacturers of and dealers in polish, varnish, enamel, lacquer, shellac, cellulose, size, paints, pigments and brushes; manufacturing chemists, etc.

VECTOR MANUFACTURING CO., LTD., 118, Fulham Road, South Kensington, London, S.W.3. Registered May 11. Nominal capital, £200 in £1 shares. Consulting, research and analytical chemists, chemical manufacturers, glassblowers, manufacturers of and dealers in glass dyes and biological stains, etc. Directors: H. D. Murray, D. A. Spencer.

Zinc Production in United States

ACCORDING to the United States Bureau of Mines, the production of primary refined zinc in the United States, from ores of domestic origin, amounted to 489,361 short tons in 1930, compared with an output of 612,136 tons in 1929.

Production from foreign sources was 8,684 tons, compared with 13,311 tons in 1929. In addition to the output of primary zinc, 34,849 tons of re-distilled secondary zinc was produced, compared with 47,348 tons in 1929. Of the total output of 532,894 tons, 366,857 tons was distilled primary zinc, 131,188 tons was electrolytic zinc, and 34,849 tons was re-distilled secondary zinc. A more detailed statement of zinc production will shortly be published.